17616

NATIONAL LIBRARY
OTTAWA

CANADA

BIBLIOTHÈQUE NATIONALE
OTTAWA

NAME OF AUTHOR....JACK...MARTIN.....

TITLE OF THESIS...A...FUNCTIONAL....ANALYSIS
OF.....COMMUNICATION...BEHAVIOR
IN.....SMALL...LEARNING GROUPS

UNIVERSITY.....UNIVERSITY...OF ALBERTA

DEGREE FOR WHICH THESIS WAS PRESENTED....Ph. D.....

YEAR THIS DEGREE GRANTED.....1973.....

Permission is hereby granted to THE NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed) Jack M. Martin

PERMANENT ADDRESS:

11715 - 83 ave
Edmonton, Alberta

DATED Aug. 30 1973

NL-91 (10-68)

THE UNIVERSITY OF ALBERTA

A Functional Analysis of Communication Behavior in Small Learning Groups

by

© Jack F. Martin

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

IN

SOCIAL PSYCHOLOGY OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1973

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled A Functional Analysis of Communication Behavior in Small Learning Groups submitted by Jack F. Martin in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Social Psychology.

John McLeish

Supervisor

M. Patricia Brown

John C. Hudson

F. Sisti

Kenneth MacGregor-Dale

External Examiner

Date July 13, 1973

TO: MABEL LEADLAY (1897 - 1973)

ABSTRACT

The aim of this thesis is to report a crucial test of B.F. Skinner's verbal behavior hypotheses (of Verbal Behavior, 1957) and reinforcement principles in general, in answer to the criticisms of anti-behaviorists, perhaps best epitomized by Noam Chomsky. Using the verbal operants defined by Skinner, behaviors in three different kinds of "live" groups, as well as verbal transcripts and video-tape recordings of these "live" sessions, were coded. A functional analysis of these codings was carried out through the implementation of computer programs which analyze the on-going interactions of group members in terms of the tri-member sequence consisting of discriminative stimulus, response, and reinforcement. The main hypothesis guiding this work was that reinforcement is not something specially contrived in laboratories with animal subjects (pace Chomsky), but the process under the constraints of which ordinary people behave in normal social situations.

We conclude that our analyses have established a prima facie case for the following general principles:

(i) the verbal operant categories, conceived by Skinner, satisfactorily describe all the communicative behavior we have observed in groups. His analysis is comprehensive, functional and operational;

(ii) the basic principles of the experimental analysis of behavior, in particular, the concept of contingencies of reinforcement, satisfactorily account for all increases and decreases in the rate of emission of the verbal operants in a group situation

(iii) the relatively "spontaneous" behavior of human subjects in an interacting group is under the control of the principle of causality; this can be revealed only by a systematic analysis of the behavior of all participants in terms of some such complex and functional model as that provided by B.F. Skinner.

ACKNOWLEDGEMENTS

The successful completion of this thesis was made possible by the constant stimulation, guidance and counsel of Dr. John McLeish. The discriminative stimuli and reinforcements which controlled the large set of operants which facilitated this writing are to be found, I'm sure, in his verbal output over the past three years. Others who engaged in this 'shaping' process are Dr. Wayne Matheson, Mr. Dan Precht, Dr. Kenneth MacCorquodale, Dr. Patty Browne, Dr. Ted Aoki, Dr. John Osborne, Miss Lynda Pocock, Mr. Bob Bedecki, and Mr. Mike O'Neil. Finally, I wish to acknowledge my direct debt to the experimental work and writings of Dr. B.F. Skinner.

TABLE OF CONTENTS

CHAPTER		PAGE
I	THE PROBLEM PRESENTED	1
	Introduction	1
	A Science of Behavior	4
	Skinner's Contribution to a Science of Behavior	8
	Sources of Skinner's Behaviorism	16
	Sources of Skinner's Analysis of Verbal Behavior	22
	Skinner and Chomsky	39
II	RESEARCH METHODOLOGIES	50
	Introduction and Research Materials	50
	Coding Systems and Techniques	53
	The Development and Use of Computer Programs	61
	Methods of Analyzing the Psychotherapy Group Sessions	64
	Methods of Analyzing the Learning Group Session	65
	A General Statement of Findings	67
III	CONTINGENCIES OF REINFORCEMENT IN THE PSYCHOTHERAPY GROUP SESSIONS	69
	Background	69
	Analysis of Themes	71
	Descriptive Analysis of Verbal Interaction	76
	Functional Analysis of Contingencies of Reinforcement	83

IV THE OPERATION OF PRINCIPLES OF REINFORCEMENT IN A SMALL LEARNING GROUP 106

V SUMMARY 131

SELECTED REFERENCES 142

APPENDIX 1 - RULES AND CONVENTIONS FOR THE CODING SYSTEMS 146

APPENDIX 2 - INTERACTION BY CATEGORIES AND PEOPLE FOR PSYCHOTHERAPY GROUPS 153

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
I	Verbal Operant Categories	55
II	Theme Analysis of Tavistock Session 1	72
III	Theme Analysis of Gestalt Session 1	73
IV	Two-Way Analysis of Variance Table - Treatments by Categories	78
V	Two-Way Analysis of Variance Table - Treatment by People	78
VI	Summary of One-Way Analysis of Variance - Treatment Differences for 8 Verbal Operant Categories	80
VII	Contingencies of Reinforcement Operative in Tavistock Session 1	85
VIII	Contingencies of Reinforcement Operative in Gestalt Session 1	89
IX	Contingencies of Reinforcement Operative in Learning Groups	109

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
1	Illustration of Learning as Operationally Defined	63
2	Sociogram of Interaction in Learning Groups In Terms of Reinforcement and Positive Stimulation.	115
3	Cumulative Graphs of Tommy's Operants.....	118
4	Cumulative Graphs of Instructor's Operants	121

CHAPTER 1

THE PROBLEM PRESENTED

INTRODUCTION

The advent of group psychology in this present century has brought with it an increasing interest in the interpersonal dynamics of social interaction. Since a large portion of such interaction is accomplished through the mediation of communication behavior, special emphasis has been ascribed to the study of language - its functions and its development.

Research workers involved in the study of group process and structure have proposed many varied explanations of verbal communication and its function in the small group situation. Bales (1950) considered the verbal behavior of group members to be a continual reflection of the moment-by-moment balance struck in the group between free-flowing emotion and deliberate task-oriented work. Powdermaker and Frank (1953) have described verbal interaction in the therapeutic group as representing a number of successive themes. This view was also held by Mann (1967) with the addition that each theme revolves around the group's perception of the trainer or group leader. Since this perception is modified and altered as the group evolves, many different themes develop. Eric Berne (1963) in Games People Play thought that the verbal behavior of each member within the group was a

reflection of the equilibrium established between three possible individual ego states which he describes at great length. Finally Foulkes (1964) takes the view that the group has a number of bipolar 'antagonistic' conflicts and that it is these conflicts that are reflected in the communications of the group members.

Other students of group dynamics have devised elaborate coding systems which systematically record the ongoing behaviors of participants in social encounters of various kinds. Of these, the work of Bales (1950, 1970 - "Interaction Process Analysis"), Flanders (1960, 1971 - "Flanders System of Interaction Analysis") and Mann (1967 - "Member-Leader Analysis") is worthy of specific mention.

However, while the theorizing of Bion, Foulkes, Berne, and others is philosophically interesting, and the careful work of Bales, Mann and Flanders useful in providing objective structural descriptions of verbal interaction, none of the research workers mentioned have successfully explained the phenomenon of language in scientific terms. Such an explanation, ideally stated, can be made possible only with the establishment of laws of causality which govern the emission of particular words, sentences and phrases.

The ideas of B.F. Skinner (1957) concerning a functional analysis of "communication" behavior represent the first serious attempt to establish causal connections in this area. Unfortunately, Skinner provides principles of explanation rather than empirical evidence for the validity of his statements. The aim of the project

reported in this thesis is to examine Skinner's ideas about communication behavior, along with his reinforcement theory in general, and to test them by careful experimentation. Stated in another way, the present study is interested in determining whether or not social, communication behavior is governed by causality and hence open to legitimate scientific inquiry.

The present chapter will attempt to outline a particular philosophical orientation to the study of human behavior (from a quasi-historical perspective) which has been adopted as the theoretical basis for the empirical research which is the focus of later chapters. Emphasis will be given to the development of this tradition, known as behaviorism, and to the criticisms it has received from other schools of philosophy and psychology. Much of the chapter is devoted to the writings of B.F. Skinner and Noam Chomsky, whose relationship epitomizes the long-running conflict between the behaviorists and the anti-behaviorists. The main aim of the chapter is to establish, by 'debate', the particular brand of behaviorism advocated by Skinner as a valid approach to the development of a science of communication behavior. Chapter 2 deals with the designs, methods and techniques employed to test Skinner's hypothesis about communication behavior against the objective reality of human interaction in small group situations. Chapters 3 and 4 discuss research findings in detail with respect to psychotherapy and learning groups. The fifth and final chapter of the thesis summarizes, evaluates, and discusses the material in the first

four chapters and provides an outline for future research work in the area of communication behavior.

SCIENCE OF BEHAVIOR

Of all psychological and philosophical doctrines, behaviorism is probably the most controversial. While somewhat acceptable in the animal laboratory, it s doctrine of determinism, and its concentration on quantifiable pieces of behavior without recourse to thought, intention or spirit; seem to many to be pejorative when applied to the domain of human affairs. Aside from this kind of emotional reaction, serious criticisms of the behavioristic position do exist, and any piece of research work which adopts behaviorism as it s theoretical base must deal with such criticisms. To do so, requires the possession of a number of criteria which can be used to evaluate the assets and liabilities of a particular position and the criticisms it gives rise to. If a psychology is stated to be the science of behavior it can be and should be evaluated according to basic scientific principles (cf. McLeish, 1962; Skinner, 1959; Nagel, 1965; etc.).

Psychology as the science of the behavior of organisms makes certain basic assumptions which originate not as arbitrary prejudices, but as generalizations about the results of observation and experiment. Three of these basic assumptions, are objectivity, simplicity, and causality. Before any theory or piece of research qualifies as science,

it must incorporate these three fundamental tenets.

The scientist is distinguished from the ordinary man by the possession of a specialized method. He is involved with examining facts in an objective manner. Tradition, affection, prejudice, emotion and sentiment must not influence his judgements. The scientist tends to gravitate towards naive realism or to materialism - he believes in the existence of an external reality and further, that he, as a scientist, can come to grips with this reality.

The scientific expert is not egocentric or anthropocentric in his thinking. He initially distinguishes between the subject (himself) and object (external reality), and conceives his task to be the description of the object as it is itself, quite apart from human hopes and fears. This, briefly stated, is the principle of objectivity.

In addition to accepting objectivity, the scientist makes the basic assumption that Nature is inherently simple. It is from the axiom of simplicity that the principle of economy is derived. This principle states that the best explanation of observed phenomena, assuming of course that the explanation is sufficient, is the simplest or least complex. The importance of the canon of simplicity is that when more complex traditional explanations are ruled out in a systematic way, the chaos presented by nature is reduced to manageable proportions. In psychology, animal and human behavior can be reduced to certain broad principles which enable us to understand individual peculiarities

which would otherwise remain forever mysterious and inexplicable. It is the principle of economy which leads to the rejection of the notions of dualism and vitalism along with the proliferation of entities and constructs which accompany them. This does not mean that scientific explanations are necessarily easier to understand than popular beliefs. However, as McLeish (p. 5, The Science of Behavior) notes: "It does mean that in the long run the scientific picture of the universe is simpler, easier to understand, is more general in its content (tending towards universality of explanation), and is more economical in its organizing principles than any other picture."

A third basic assumption made by the scientist is that a cause precedes an effect, and that the effect not only follows, but follows from the cause. Since the function of science is not only descriptive but explanatory, the principle of causality is exceedingly important. In psychology, a behavior can be explained only when a direct connection between a certain condition and a certain form of that behavior has been demonstrated. Without such explanation, it is impossible to predict and control the phenomena under investigation. Thus, causal description is the aim of scientific investigation.

The principle of universal causation does not allow for capriciousness. The reason a desired effect is not produced is verifiably because the materials used are not of the necessary purity, or the procedure has been altered in some significant particular, or the alleged association may not be real but the result of faulty observation and

interpretation. Thus by assuming causality the scientist assumes that his experimental work may be replicated by other scientists providing the relevant independent variables are properly controlled.

If it can be established that the effect always follows the alleged cause, a scientific law has been established. Sometimes the production of a particular effect may require a complex of factors, some perhaps operating at a particular level of functioning. This is often the case in the study of behavior. As a result there are few laws of behavior; especially in comparison to physics or astronomy. Often reports on behavior are expressed in statistical terms. Instead of a simple description in terms of causes and effects we are presented with a series of mathematical correlations which cannot be interpreted unequivocally. A statistical uniformity is not the same as a causal description.

The complexity of human behavior requires that special methods of investigation be devised to elucidate the principle of causality in this field. But this is no reason to assume that behavior is capricious - indeed to make such an assumption violates the scientific nature of psychology.

Although several mathematicians and physicists have suggested that sciences must discard the notion of cause and have questioned the human ability to observe objectively (for example Poincaré, Mach, Pearson, and more recently the quantum physicists); the particular brand of sophisticated dualism and agnosticism which they propose to

replace these principles is not regarded favorably by most scientists. Together, the principles of objectivity, simplicity and causality will be employed throughout this chapter as a basis upon which to evaluate the behavioristic and anti-behavioristic positions.

SKINNER'S CONTRIBUTION TO A SCIENCE OF BEHAVIOR

The work of B.F. Skinner has been characterized by a fruitful amalgam of the operational approach to behavior and laboratory procedure. The product of this union has been the 'experimental analysis' of behavior. The enormous efficiency of scientific methodology in other disciplines led Skinner to apply it in a traditional manner to the study of human affairs.

Skinner's adoption of basic scientific methodology (which includes the principles of economy, objectivity and causality) led him to make certain assumptions about behavior.

1. Behavior must be assumed to be lawful and determined if it is to be predicted and controlled.
2. Behavior is assumed to have no peculiar properties which require unique methods or special kinds of knowledge in order to understand it. We must assume that the relationships discovered in other sciences apply to the study of man, unless there is evidence to the contrary.

3. The variables of a science of behavior must have a physical status to which the usual techniques of science are adapted. The variables immediately available for a scientific analysis lie outside the organism, in its immediate environment, or in its environmental history. (Unobservable internal states and mental structures are hypothetical entities which are irrelevant to a science of behavior.)

4. The variables of a science of behavior must be described in physical terms - in the language of physical science. They must be explained in their effect upon the scientist and the organism under observation.

One of the first serious attempts to study the changes brought about by the consequences of behavior was made by E.L. Thorndike in 1898. Thorndike found that a cat placed in a box, from which it can escape only by unlatching a door, will exhibit many different kinds of behavior, some of which may be effective in opening the door. When the cat was placed in such a box again and again, the behavior which led to escape tended to occur sooner and sooner until eventually escape was achieved without delay and without "error". The cat had solved its problem as if it were a "reasoning human being", though perhaps not so speedily. Yet Thorndike observed no "thought-process" and argued that none was needed by way of explanation. He could describe his results simply by saying that the cat's "escaping behavior" was "stamped in" because it was followed by the opening of the door, repeatedly.

The fact that behavior is "stamped in" when followed by certain consequences Thorndike called "The Law of Effect". What he had observed was that certain behavior occurred more and more readily in comparison with other behavior in the situation described. By noting the successive delays in getting out of the box, and plotting them on a graph, he constructed a "learning curve".

Thorndike in short had made a discovery. His learning curves revealed a process which took place over a period of time and which was not obvious to casual inspection. The investigation of E.L. Thorndike proved to be a valuable input to the subsequent work of B.F. Skinner. By studying and modifying the Thorndikian experiment, Skinner began the work which resulted in a sophisticated form of behavior technology.

As an undergraduate, Skinner studied biology. As a consequence he had become familiar with Loeb's Physiology of the Brain and Pavlov's Conditioned Reflexes. At Harvard, in graduate school, Skinner came in contact with W.J. Crozier who had studied under Loeb. The thing that impressed Skinner about Crozier and Loeb was that both talked about animal behavior without mentioning the nervous system; and did so with surprising success. In Skinner's mind Loeb and Crozier cancelled out the physiological theorizing of Pavlov and Sherrington and thus clarified what remained of the work of these men as the beginnings of an independent science of behavior.

Skinner's doctoral thesis was in part an operational analysis of Sherrington's "synapse", in which behavioral laws were substituted for supposed states of the central nervous system. The other part of the thesis was experimental and marked an attempt to look for lawful processes in the behavior of the intact organism. In attempting this, Skinner adhered closely to the dictum of Pavlov: Control your conditions and you will see order.

Skinner soon began to realize that the Thorndikian "learning curves" do not describe the basic process of "stamping in". Thorndike's measure - the time taken to escape - involved the elimination of other behaviors and his curve depended on the different things a cat might do in a particular box. It also depended upon the behavior which the experimenter or the apparatus happened to select as 'successful' and whether this was common or rare in comparison with other behavior evoked in the box. In short, Thorndike had lessened his objectivity by focusing on a specific instance of behavior without considering the totality of the cat's behavior. Further, he had assumed a certain 'inner' motivation on the part of the cat to escape the box, in exclusion of other such motivations.

Skinner also found many expressions associated with Thorndike's explanation of the experiment (such as "trial-and-error learning") to be superfluous. Something is read into the experiment by calling a piece of behavior a trial and there is no reason to call an unrewarded behavior an "error". To assert that an organism learns or develops "a habit"

is also misleading.

Learning curves showed that various kinds of behavior evoked in complex situations are sorted out, emphasized, and reordered. The basic process of "stamping in" brings this change about, but it is not reported directly by the change itself. In Skinner's view, the barest possible statement of this process is this: We make a consequence contingent upon certain physical properties of behavior and the behavior is then observed to increase in frequency.

With the discovery of frequency or rate of responding as a basic datum, the main technical problem confronting Skinner was to design a controlled experiment to provide for the observation and interpretation of frequencies. Behavior which competes with the behavior being studied must be eliminated or at least held constant.

A series of experiments followed the completion of Skinner's doctoral thesis through which it is possible to trace the effect his basic assumptions about behavior had on the development of the laboratory science. The end-product of this early work was a very simple experiment with a hungry organism placed in a quiet box, conditioned to receive food from a small food-tray operated electrically. A relatively simple bit of behavior is then selected - usually one that may be repeated freely and rapidly, and which is easily observed, and recorded. The process which Thorndike termed "stamping in" could now be studied directly in a controlled environment.

In this new environment, long run-ways, latches, and doors were shown to be unnecessary to study behavioral processes. The length of time to perform used by Thorndike as the basic datum of analysis was replaced by Skinner's rate of responding. Finally, the method of averaging learning curves to produce smoothness was replaced by the method of rigidly controlling variables in the individual case. All of these advances were the result of Skinner's basic concern for lawfulness and observability.

Obviously, at this time, a behavioral technology had begun to develop. Faced with practical problems in predicting frequencies of behavior, Skinner found that you necessarily emphasize the refinement of experimental variables. Much of conventional statistical procedure is eliminated with this approach. By discovering, elaborating and fully exploiting every relevant variable we may eliminate in advance of measurement the individual differences which obscure the behavior under analysis. This achieves the same result as increasing the size of groups, and it will almost certainly yield a bonus in the discovery of new variables which would not have been identified in the statistical treatment. The improvements in experimental technique made by Skinner, give us the control and prediction of the behavior of a single organism which conventional statistics lack.

Two major points suggest themselves from this brief sketch of the early development of Skinner's laboratory methods:

A. In choosing reinforcement as a basic principle and rate of responding as a basic datum, and in recording the latter conveniently in a cumulative curve, important temporal relations between behavior and external conditions become visible. (Once this has happened our scientific method is conceived as being the elucidation of causal connections.)

B. When practical control of the organism is achieved through operant techniques, particular kinds of theories of behavior lose their point. Through the representation of relevant variables in physical terms, and their manipulation, we come to grips with the origins of behavior itself. When behavior shows order and consistency, we are no longer concerned with alleged physiological or mentalistic causes. Relations are discovered which take the place of theoretical fantasies.

In the experimental analysis of behavior we address ourselves to a subject matter which is manifestly the behavior of an individual, which can be interpreted in terms of causality and hence which can be understood without statistical aids.

In Verbal Behavior (1957) Skinner extrapolates experimentally verified principles of operant conditioning and reinforcement from the laboratory to the naturalistic social environment of man, in an attempt to explain functionally human verbal interaction. The choice of Verbal Behavior as a title for the 1957 text is somewhat misleading in that the definition of this phenomenon proposed by Skinner -

i.e. "behavior reinforced through the mediation of other persons" (p.2) - does not correspond to traditional linguistic formulations. In contrast to the linguist who concentrates solely on spoken or written statements, Skinner includes gesturing and reading under the rubric of verbal behavior. The net result is that while linguistic analysis focuses almost exclusively on the individual speaker or writer, and entirely on the verbal content, Skinnerian functional analysis focuses on the social interaction between speaker and listener, or writer and reader. This includes "verbal" and "non-verbal" behavior, or in our terminology, vocal and non-vocal events.

To Skinner, verbal behavior is comparable to, and obeys the same laws and principles as do any other forms of behavior - it differs from other kinds of behavior only by virtue of the fact that it subserves the function of communication. It is behavior which is reinforced through the mediation of others.

Verbal Behavior is not offered as an account of laboratory experiments in the development and production of verbal behavior, but as an interpretation of such based on a knowledge of laws of reinforcement contingencies divulged by exacting laboratory research in other areas of behavior. As Skinner himself states:

> "The emphasis is upon an orderly arrangement of well-known facts, in accordance with a formulation of behavior derived from an experimental analysis of a more rigorous sort. The present extension to verbal behavior is thus an exercise in interpretation rather than a quantitative extrapolation of rigorous experimental results." (p. 11, 1957)

Although not documented with experimental data, Skinner's analysis of verbal behavior attempts, as far as possible, to ensure that the conditions appealed to be accessible and manipulatable - the ultimate aim of such analysis being to predict and control verbal behavior. The verbal operants proposed by Skinner have been used in the present project as a basis upon which an elaborate system of social interaction analysis has been constructed. This system, along with definitions of the verbal operants employed may be found in Appendix 1.

SOURCES OF SKINNER'S BEHAVIORISM

Behaviorism, of course, did not originate with B.F. Skinner or E.L. Thorndike. The work of these scientists is based upon a philosophical tradition extending back to classical times. In the nineteenth century philosophical behaviorism began to be rigorously applied in experimental studies of human behavior - much of this work being carried out in the laboratories of Helmholtz, Du Bois Reymond, Ludwig, Bunsen, and Magnus in Germany; Brücke in Vienna; and Claude Bernard in France. At this time, Helmholtz Brücke, Du Bois Reymond, and Ludwig entered into the famous pact that they would establish and compel the acceptance of this truth: that "no other forces than physical and chemical ones are active within the organism".

The great Russian physiologist - psychologist, Ivan Sechenov, who had worked in the European laboratories, extended this principle in a novel way to include the "so-called psychical activity". He did this, not in the sense of reducing psychic events to laws of physics and chemistry but rather by demonstrating that the three concepts of: (1) the organism in its environment, (2) the tri-member reflex, (3) the process of inhibition and/or intensification of response, provided a model perfectly adequate to explain all animal and human behavior. Perhaps Sechenov's greatest contribution to behavioral science was his careful delineation of a systematic plan for the investigation of the higher nervous activities in man. Half a century later, Ivan Pavlov carried out Sechenov's experimental program and further demonstrated that human behavior is a proper area for scientific inquiry.

The successful and fruitful work of Sechenov and Pavlov was based on a very sophisticated brand of behaviorism - a behaviorism which was broad enough and flexible enough to encompass the complexity of human behavior. Whereas Russian behaviorism was broad in its scope, American behaviorism of the same period with a few notable exceptions, was narrow and was based on a misinterpretation of the methods, orientations, and objectives of the European and Russian schools. In the early part of the twentieth century, the mainstream of American behaviorism was presented by the work of John B. Watson. Rejecting the then prevalent view that psychology was a unique type of science aimed at discovering the structure of

consciousness by introspection, he proposed to study behavior using the same types of objective techniques as other natural sciences. Seizing upon Pavlov's principle of conditioning and combining this with a few ideas he had developed himself, he presented to the world a position which he termed "behaviorism". Unfortunately, Watson's only knowledge of Pavlov's position was centered around a misconceived interpretation of a few Pavlovian conditioning experiments. With no understanding of the theoretical framework within which these experiments were conducted, Watson assumed, as did other Americans who followed and revered him, that the conditioned reflex was sufficient by itself to explain every aspect of behavior, animal or human. He felt no need to extend his behaviorism beyond this basic tenet. Consequently while Pavlov in later years developed an explanation for the behavior of human subjects in institutional environments based on an extention of conditioned reflex principles (second signalling system), American behaviorial psychology continued to deal almost exclusively with animals behaving in rigidly controlled experimental environments.

To compensate for the narrowness of Watsonian explanations many American psychologists began to merge the results of animal studies with more extensive Gestalt explanations. The ensuing brand of eclecticism was well represented by the work of Edward Tolman who presented the view that learning involves the development of organized

cognitions about sets of sensory, or stimulus events. Tolman's science of behavior involved a marriage between methodological behaviorism and Gestalt explanation. The net result of this approach was that the explanations for the behavior of animals in laboratory environments become more and more divorced from the actual behaviors themselves. As explanations for behavior become progressively more esoteric and less rigorous, many American behaviorists felt the need to lend scientific credibility to their interpretations by incorporating them into a proliferation of mathematical equations. Such clusters of formulations were nowhere better represented than in the work of Clark Hull.

While Hull differed from Watson in sharing Pavlov's acceptance of consciousness as part of the subject matter of behavioral psychology he lacked the experimental techniques and theoretical rigor necessary to provide objective scientific explanations for the operation of this phenomenon. In actual fact, Hull's formulations were initially derived from a study of Pavlovian experiments. In the absence of personal experimentation his study of behavior was entirely hypothetical-deductive. Nonetheless the mass of equations and concepts which Hull originated stimulated many other American psychologists who desired a form of behaviorism which was less rigid than that proposed by Watson and which could be more readily integrated with more cognitive approaches to human performance.

Watson and Hull thus represented the extreme positions in psychological behaviorism in America in the 1930's and the 1940's.

Others who worked extensively during this period included Lashley, Guthrie, Hovland, Spence, Dollard, Miller and Mowrer. Although their approaches varied slightly, all of these psychological experimenters adhered rather closely to either a Watsonian or a Hullian position. Unfortunately, neither school was able successfully to bridge the gap between animal and human behavior without an unwarranted narrowing of subject matter or the loss of scientific credibility.

Slightly removed from the mainstream of American behaviorism, which was based largely on a misinterpretation of the Russian work, a more healthy form of behaviorism known as 'learning theory' had been gradually emerging in the United States since the work of E.L. Thorndike in the early part of the twentieth century. Thorndike's formulation of the "law of effect" and his demonstration of the signal importance of reward and punishment in the learning process opened up new vistas of behavioral experimentation which promised an easier extrapolation of conclusions from the animal laboratory to the human situation. In many ways, Thorndike's theoretical orientation to behaviorism was more similar to Pavlov's (minus Pavlov's physiological model) than to that of Watson or Hull. While the behaviorism of Hull and Watson originated from a misconstruing of Pavlovian experiments, that of Thorndike seems more firmly rooted in a much ignored segment of eighteenth and nineteenth century English utilitarianism and the twentieth century American philosophy of pragmatism. While scientific behaviorism was being advocated by Helmholtz, Ludwig and others in Europe, a few

American observers of human behavior were developing very similar ideas. In the early eighteenth century the American evangelist Jonathan Edwards set forth a doctrine of determinism which applied to the behavior of man. A century later James Rush, an early American psychologist-philosopher, attacked dualism stating that mental functions are governed by physical laws and that "mind" is nothing more than the physical function of the sense organs and the brain. These ideas were incorporated by Mark Hopkins in 1878 into an evolutionary picture of the development of man. While it is not certain that the work of these eighteenth and nineteenth century thinkers directly influenced E.L. Thorndike, it cannot be questioned that the kind of theoretical philosophy expounded by these individuals was more prominent in his thinking than was the narrow behaviorism of Watson and Hull.

The importance of Thorndike's work in influencing the contributions of B.F. Skinner towards a science of behavior has already been discussed. Through Skinner's careful experimental methodology and objective interpretation of results, American behaviorism began to deal realistically and scientifically with the problem of predicting and controlling human behaviors. Skinner's discussion of human communication behavior (1957) illustrates this concern for an understanding of naturalistic human behavior based on principles and techniques developed in the animal laboratory. Just as Pavlov extended the model of the conditioned reflex to explain human performance, Skinner has extended his own theory of reinforcement for similar purposes. The breadth and depth of the behavioral

analyses of Pavlov and Skinner represent an important stage in our search to understand man's behavior in scientific terms.

SOURCES OF B.F. SKINNER'S ANALYSIS OF VERBAL BEHAVIOR

The functional analysis of verbal behavior proposed by Skinner in 1957 can be viewed as having been influenced by a long history of linguistics, psycholinguists, and scientific advances.

In Western culture, the study of language proceeded in a relatively unsystematic way through the classical period, was relatively neglected during the period of medieval scholasticism, and was revived in the days of the Renaissance with the rediscovery of Greek culture in Western Europe. Latin was viewed as the ideal language - a thing God-given and to be revered. During this prescientific period, attempts were made to trace the origin of particular words. Word etymologies were proposed in a rather capricious fashion. When the study of Hebrew and Arabic came into vogue in the late Renaissance a serious attempt was made to show that various words in modern languages were derived from Hebrew 'roots'. The era of discovery and exploration brought new knowledge about the languages of the world. Travellers and missionaries wrote grammars and dictionaries of languages they encountered in Africa, America, and other 'new' lands, including China. As this panoply of material began to collect, some late

eighteenth century scholars began to perceive the possibilities of making careful systematic examinations of these data.

In an address delivered in 1786, Sir William Jones pointed out the possible existence of a great family of Indo-European languages, including Greek, Latin, Romance, Germanic, Slavonic and Celtic branches. This suggestion of Jones' was soon followed by the scholarly work of Bopp (1816), Rask (1818), and Grimm (1819) in the early nineteenth century. That century was the heyday of historical comparative linguists who attempted to describe changes in language systems over periods of time and to consider the familial and genealogical relationships of languages. Grimm's law, for example, is a statement of regular patterns of behavior observed in several languages and how these patterns compare. Similar attempts were made in the later nineteenth century as a result of the acceptance of Darwinian notions of evolution. By 1861, Bopp and Schleicher (1861) had convinced themselves and many others that the so-called Indo-European languages had descended from, or at least were closely related to Sanskrit (a language of which the Hindu grammarian Panini, had given a remarkably objective and succinct account in the third century B.C.) which in turn was a descendant of a single language spoken thousands of years before.

The general method adopted by the historical comparative linguists was a sort of detective work with words. Just as Sherlock Holmes collected clues left behind - a footprint, a bit of cigar ash,

an unfinished word - and reconstructed the story of the crime, so the comparative linguist (or philologist as was the popular title) collected all the words in contemporary languages which seemed to have evolved from the same word in the ancestor language, coupled this insight with a study of ancient manuscripts, and surmised what the original word must have been.

A major upheaval occurred in linguistic circles in 1870 when the Italian scholar G. Ascoli (1870) demonstrated that in certain places Sanskrit had changed what must originally have been a 'h' sound to an 's' or 'sh' sound. In effect, Ascoli's discovery spelled the end of the belief that Sanskrit was either identical with Indo-European, or the decendant most like the parent language. The ensuing re-evaluation of Indo-European vocalism was marked by the starting of a new school of linguistics. Karl Brugmann championed this new faction which was popularly labelled "the neogrammarians". The neogrammarians were operationalists who insisted that phonetic laws like Grimm's are exactly like the laws enunciated in the natural sciences. In other words, the kind of sound shift summarized in Grimm's Law is, according to Brugmann, a physical phenomenon like that described in the law of gravity - hence it has no exceptions, and any apparent cases of deviation from the law are due to data or laws not yet discovered. The neogrammarian point of view led to a focusing on minutiae, the amassing of large amounts of data and to a proliferation of rules. However the application of positivist ways of thinking to the area

of linguistics moved linguists into closer contact with other scientific disciplines.

Psycholinguistics had its formal start when the neogrammarian Delbruck (1901) examined the question of psychological doctrine in linguistics. Delbruck was considering the two mentalistic theories of Herbart and Wundt as possible starting points for a new science of language. These gave different accounts of how 'ideas' became organized by a process of 'association'. His conclusion was that the facts of linguistics could be described with equal plausibility and utility, in the language of either of these theorists.

At the same time as linguists were becoming increasingly interested in developments in other sciences, there was a subtle shift from the study of changes in language systems over periods of time, to the study of the characteristics of language systems at given points in their histories. In other words, descriptive linguistics (as the latter was termed) was slowly replacing historical comparative linguistics as the major field of concern for most linguistic scholars. Comparative linguistics did not really languish nor fall behind, but it began to lose its pre-eminence, as another branch of science began to equal it in importance. The approach of the descriptive linguists was structural and owed much to the writings of de Saussure who as early as 1878 had laid the ground rules for an account of the formal structure of language (la langue), as distinct from the language as actually spoken (la parole). The basic concept of linguistic analysis which the descriptive linguists advanced and developed

was that of the phoneme. The two men primarily responsible for the original development of the concept were the Russian linguists Baūdouin de Courtenay and his student Kruszewski (see Kruszewski, 1881); the subsequent developments took place largely among linguists of the so-called Prague circle (Jakobson, 1928; Trubetskoy, 1939).

The position of the 'phonemicists' can be stated as follows. First, they were interested more in system than in detail: they did not wish to study each elementary particle of a language individually and successively, but wanted first to conceive the structure of the whole - what kind of system is formed. Trubetskoy made elaborate studies and classifications of the relations of each unit to the whole and to each other unit in the system. The 'phonemicists' were the first to study and report on the distribution of linguistic units - for example, whether a speech sound occurs with equal frequency initially, medially and finally in the syllable or word; what sequences of speech sounds occur, and similar questions. These were found to be highly characteristic for each language. However greater attention was devoted to defining and isolating the phoneme. Regardless of what actual sounds or 'phones' were emitted by a speaker on a given occasion, the unit of language was not the 'phone' but the 'phoneme'.

The basic 'structuralistic' approach of the 'phonemicists' was brought to a high level of scientific sophistication and rigour by the

great American linguist Leonard Bloomfield. Bloomfield brought linguistics into line with basic scientific principles. He was largely responsible for the development of psycholinguistics into a proper scientific discipline. The 'psychological objectivity' which Bloomfield adopts in his study of language has a long and varied history. For present purposes the work of Johann Gottfried Herder provides a good starting point.

Herder (1772) had been influential in introducing a pre-Darwinian naturalistic, evolutionary point of view into linguistic science. Having rejected the explanation of language as a gift of God or as due to some kind of social agreement and deliberate invention (after the fashion of Rousseau's 'contract social'), he argued that the origin of language must be understood as a natural development - as an expression of the psychological traits which distinguish man from other animals.
In positing what today might be considered an explanation based on man's capacity for redintegrative conditioning, Herder believed that man's capacity for discrimination and attention makes it possible for him to single out a feature of an object and use this feature as a sign of the object. Thus, the name of an animal may be derived from an imitation of the sound which it makes. Herder adopted the Leibnitz (1646-1716) model of development and believed that the individual develops by a sequence of changes which are lawfully interrelated. Language and reason were declared to be products of learning, tradition, and external influences and, as such, emerge as subjects for scientific -

genetic and comparative - investigation.

In 1786, John Horne Tooke, following the classical tradition of analysis of "parts of speech", undertook the task of relating all words to physical phenomena. Beginning with the observation that nouns and verbs are necessary for communication, and that the grammatical distinction between the noun and the verb is arbitrary and unnecessary as far as reference is concerned, he examined prepositions, conjunctions, adverbs, adjectives and all other particles of speech. He then attempted to show by an historical a posteriori method, that all parts of speech were either nouns or verbs in disguise which had lost the habit of inflection. For Tooke, grammar and structure were not as important as the actual behavior indicated by words and the association between word and behavior. The work of Tooke, with all its shortcomings, was thus an important forerunner to Skinner's functional analysis of behavior.

Another early approach to the study of language and its origins was that made by the Scot James Burnet, Lord Monboddo (1792) noted for his pre-Darwinian evolutionary theory that man was descended from monkeys. Burnet was one of the first to put forth the notion that speech had evolved from the imitation of motion. The imitation of sensory impressions by "gestures" of the vocal organs, produces a sound as a by-product. In all probability it was the English associationist Hartley (1749) who was instrumental in influencing Monboddo's views,

since it was he who had originally developed the associative explanation of language in child and race.

Oddly enough, the 'mentalistic' psychologist Wundt, mentioned earlier, also believed in an onomatopoeic theory of the origin of language. Accepting that speech - meaning correlations originated with the tendency to imitate sensory impressions by mouth gestures, he believed that the sound by-products of this activity became associatively connected both with the impressions and the vocal movements for speaker and hearer. Wundt's basic subjective approach prevented him from associating sounds directly with physical objects and he clung tenaciously to a theory of an alleged innate drive to imitate. The fact that his explanation of language was very similar to a Skinnerian "reinforcement contingency" explanation is obscured by these facts.

At this time a controversy arose as to whether language originated with the imitation of 'dancing' movements or of 'working' movements. This controversy was of course made possible by the insistence of Humboldt and others that man was a singing creature and that language arose in the course of song associated with rhythm of body movements. Wundt, Jesperson (1894) and Bucher (1899) became embroiled with this 'red herring' and the importance of the basic associative explanation was somewhat overshadowed on the continent.

However the American scholar William Dwight Whitney (1875, 1882) had been advancing a much more materialistic doctrine of language origin based on the work of Hartley and the American behaviorist

James Rush. It was Rush who in 1865 had pointed out that all human behavior including speech and thinking originate as a consequence of man's interaction with his environment. Rush, further proclaimed that cognition or "thinking" activity was nothing more than sub-vocal speech. In 1882, Whitney maintained that all designations of the relations of objects, as well as of the objects themselves and their activities, take their origin from what is most physical and most directly perceived by the senses. He believed that all intellectual, moral, ideal, and relational expressions develop by a gradual adaptation of expressions for sensorially perceived processes, properties, and relations; the origin of an expression has not been demonstrated until it has been traced to its physical significance. Whitney also encouraged a study of language in the individual organism as a developmental process. He believed as did Paul (1889) that all the conditions required for primitive speech creation must be present in the physical and mental nature of the contemporary human being. The writings of Dwight Whitney were extremely important in that they established a unique orientation to the study of language and verbal behavior. Whitney was almost the first to stress the "cultural" and "social" nature of language in modern terms. Skinner is indebted to Whitney for the concept of the "verbal community" - what we choose to say is not language until it is accepted and employed by our fellows. Whitney was also amongst the first to understand the causal processes operating in a social environment. Language change is controlled by external forces (including the social forces exerted by the speaker) which are observable variables. At a

very early stage Whitney emerges as a major figure in the development of a behavioristic approach to the study of verbal behavior.

Behavioriristic explanations of language really began to flourish in the work of Max Meyer who had emigrated from Germany to the United States in 1899. Meyer and his student Weiss had a great impact on the work of Leonard Bloomfield. Meyer's writings, were theoretical for the most part: their sources must be sought in his teachers, especially Planck and Stumpf, and in his reading of other authors, especially Ebbinghaus, Ernst Mach, Jacques Loeb, Friedrich Lange, Charles Sherrington and surprisingly, E.B. Titchener. Meyer held the last of these in high regard as a logical scientific thinker who would have stressed 'behavior' more if he had lived longer. The behaviorism of Meyer did not represent a sudden and radical break in the continuity of science, but it did much to facilitate and advance physicalism and operationalism. It sought to break away from the current and long-established dualistic and mentalistic vocabularies. As such it gave an appearance of novelty to behaviorism. While Stumpf, Helmholz and Ebbinghaus had adopted objective methodologies, they continued to employ the old mentalistic language which made them appear to be continuing in the old tradition. As for methodology, these men were in the mainstream of the historical evolution of psychology, epitomized by the Russian Sechenov as early as 1863. On the other hand Wundt and Titchener preserved the language of mentalism and the methodology of constrained and prolix introspection and neglect for the changes in behavior in learning. Their work represented an obsolescent stage in

the development of psychology linked as it was to theological and metaphysical philosophy which bore the character of dualism and subjectivism.

For Meyer (1911) the basic task of psychology consisted in the study of the complete dependence of all human activity on the functional properties of the nervous system and on the changes which these functional properties undergo during life. He attacked a science of the subjective as an introspective science limited in its possibility of generalization and hardly deserving the name of science at all. To Meyer the principles of objectivity and determinism were the simplest assumptions necessary and sufficient to explain the facts of human behavior. He was adamant in maintaining that psychology, if it is to advance must restrict itself to describing only that which can be measured. In 1921 Meyer added the principle of 'social significance' to his doctrine.

> "If we call psychology a Natural Science, it is the study merely of the nature of 'the Other-One in relation to us'. And if we call psychology a Social Science, it is the fundamental social science." (1921, p.9)

Meyer's notions of operationalism and social significance are particularly relevant to the present discussion since they coincide with many of Skinner's own views. In fact Skinner's definition of verbal behavior is based on the same behavior position as that adopted by Meyer.

With regard to the origin of language, Meyer rejects the idea of imitation as an abstract property of the nervous system, and considers

improbable a complement of innate imitative reflexes in response to visual, olfactory and kinesthetic stimuli. However he does not suggest conditioning processes during a babbling period as the determiners of a system of phonemes. Rather he considers reflex 'auditory imitative reaction' in the infant to be an essential provision by 'Nature' for human acquisition of language. Meyer's discussion of language is somewhat surprising in view of his rigorous adherence to learning and conditioning processes. He even goes as far as to suggest that initially infants process by inheritance reflexes of reacting to signals of form as well as of color. Eventually of course, these reactions are by habit. This allegedly hereditary response to a 'Gestalt' is similar to Kohler's (1925) description of chimpanzees fleeing from a stuffed donkey. Of interest is the fact that Kohler, as well as Koffka and Wertheimer, was also a student of Carl Stumpf at Berlin.

Albert Paul Weiss was a devoted pupil of Max Meyer, whose system formed the basis of Weiss's work. The pupil's enormous advances were due primarily to his evaluation of language. He saw that language supplied the key to those phenomena of human conduct and achievement which hitherto had been largely attributed to non-physical forces. Weiss's (1925) view of the development of language was strictly limited to a stimulus-response conditioning model. He firmly believed that sequences of events in which human beings participate can be understood only when one knows that the members of a speech community have been trained to produce conventional speech-sounds in certain types of situations and to behave accordingly in response to these sounds. Since Weiss (1925) shared Meyer's view that

the fundamental explanations of human behavior are to be sought in the properties of the nervous system, he mentions that the speech-sound is effective biosocially as a trigger-mechanism, thanks to the training (structural modification) of the speaker's nervous system. However, he stated that psychology differs from physiology in being concerned only with socially significant behavior (Weiss, 1919). Thus, it is by virtue of this common attunement to the speech-community that the members of that community co-operate. The space be tween their nervous systems is bridged, from moment to moment, by the sound waves which they utter and hear. Skinner's discussion of the verbal community shares many Weissian notions.

Apart from his emphasis on the social conditioning of language, Weiss (1923) repeatedly draws attention to the dynamic and physical nature of human verbal interaction. He notes that specific types of external stimuli, in addition to releasing specific manual responses, also release verbal responses, and these become for other individuals, substitute stimuli for the original stimuli to which they can emit further responses. Thus, in the evolutionary development of language a greater and greater number of objects and events are represented by substitute language stimuli which exhibit a wider range of interrelationships than the original objects and events themselves. Of course Weiss's argument is based on the assumption that language is a form of behavior and can be studied and talked about in physical terms. The basic behaviorism of Weiss, along with his ideas concerning social conditioning and the nature of language, was a major input into the corpus of knowledge directly available to B.F. Skinner.

Leonard Bloomfield's greatest contribution to the study of language was to apply consistently a scientific model: more than anyone he succeeded in making a science of it. Others before him had worked scientifically in linguistics, but no former linguist had so uncompromisingly rejected all prescientific methods, or had so adamantly demanded the use of terms that would imply no tacit reliance on factors beyond the range of observation. While much of Bloomfield's work was devoted to the rigorous application of basic concepts such as the phoneme and the morpheme which could be utilized to build a general theory of linguistic structure, his adoption of specific psychological and scientific orientations and methodologies did much to bring linguistics out of its nineteenth century isolationism and to mark the beginnings of psycholinguistics as a legitimate area of scientific study.

In 1914 Bloomfield depended on Wundt for all his psychology, general and linguistic. However by 1933 (p. vii) he had replaced Wundt with Weiss and disclosed that he had tried in his work to meet the demand of the 'mechanists' that the facts be presented without any assumption of mental factors. Bloomfield's utilization of Weissian psychology is best illustrated by his definition of meaning (1926) as 'a recurrent stimulus - reaction feature which corresponds to a form'. (He undoubtedly accepted Weiss's definition of the meaning of a form in terms of the stimuli which evoke it as a response and the responses which it evokes as a stimulus.)

It was a consequence of Bloomfield's adoption of the Weissian stimulus-response doctrine that he felt no great need to begin his account of language at some prelinguistic stage of animal communication. (By this time of course, the overwhelming influence of Darwinism had moderated as the doctrine of evolution became established in the cultural world of science.) Thus, while philosophically believing that language had developed as resonse-movements to vocal stimuli in the form of animal sounds which happened to produce voice, he devoted no appreciable time to questions of this nature. It was the social nature of language as it determined the use and development of words and phrases to which Bloomfield addressed himself. Noting that in some situations human beings co-operate in making social responses, he argued that a practical stimulus situation, acting on A, releases in him a linguistic response which, through the mediation of sound waves, acts as a linguistic stimulus to B, who thereupon makes a practical response adaptive with respect to A. As Bloomfield (1933, p. 24) says, "Language enables one person to make a reaction (R) when another person has the stimulus (S)". And, "The division of labor, and with it, the whole working of human society is due to language". Linguistic psychology was defined by Bloomfield as the study, in their special bearing on language, of the mechanisms which make people say certain things in certain situations and which make others respond appropriately when these speech-sounds strike their eardrums.

It is interesting to note that Bloomfield, like Whitney before him gave a great deal of attention to the speech community and the more specific social situations in which speech occurs. To these scientists, the meaning of a given utterance was to be found in the independent variables which control its emission. This realization is fundamental to a functional approach to the problem of verbal behavior. As long as the meaning of speech is thought to lie in existential properties of the dependent variable (i.e. a specific utterance) it must forever be hypothetical and mysterious. In contradistinction, the view held by Whitney and Bloomfield opens the questions of speech and meaning to empirical and scientific study.

Many of the ideas of Whitney and Bloomfield were shared by Grace de Laguna whose functional approach to the study of language extended to the perplexing and complex problems of thinking, attitudes, and beliefs. For de Laguna (1927) the primary function of any communication is to co-ordinate the activities of a group. She further proposed that speech is originally (in history and in the infant) dependent on perceived physical conditions, and that the ultimate significance of language was derived from the situations in which it occurs and from the behavior which it occasions. Her detailed discussion of the complexities of the physical properties of co-operative situations and how these become internalized is a major contribution to the science of human behavior.

The ideas of Whitney, Bloomfield and de Laguna proved to be a rich legacy for B.F. Skinner. (While Skinner does not acknowledge a debt to

Bloomfield or Whitney as he does to de Laguna, it seems ridiculous to assume that one does not exist - albeit perhaps indirect.) It was this tradition more than any other which epitomized the movement away from isolated formalism and structuralism in psycholinguistics to a scientific functionalism which incorporates laws of causality in its explanatory framework. In 1957 Skinner proposed a functional analysis of verbal behavior on the basis of the learning and reinforcement principle, he had discovered in a laboratory setting.

SKINNER AND CHOMSKY

Since the publication of Verbal Behavior in 1957, many linguists, psycholinguists and psychologists have reacted strongly to the intrusion of behaviorism and learning theory into the realm of verbal behavior. Gestalt psychologists and the generative or transformational grammarians epitomized by Noam Chomsky, have been especially vocal in their admonishments and criticisms. These students of human behavior and linguists hold that the transition of psychology from speculation to science which is generally attributed to the behaviorists is unwarranted. The behavioral sciences are said merely to mimic the surface features of the natural sciences. It is said that much of their scientific character has been achieved by a restriction of subject matter and a concentration on rather peripheral issues. Further, it is maintained that such narrowing has not produced far-reaching and significant results - certainly it has achieved no useful understanding and control of such complicated behavior as speech and language usage.

Chomsky (1959, 1961) proposes a synthesis of philosophical grammar and traditional structural linguistics to counter the over-simplistic model of the behaviorists. He urges the development of a science of the mind (1961) which must replace, or at least subsume, a science of behavior if real understanding of the more complicated forms of human behavior is to be achieved.

Chomsky's criticisms seem to center on four main arguments:

1. The prediction of the behavior of a complex organism requires, in addition to information about external stimulation, knowledge of the internal structures of the organism. Any attempt to ignore these inner mechanisms results in an unwarranted limiting of subject matter and a concentration on surface features and peripheral issues. No knowledge of any real significance can be obtained from studies which deal only with behavior.

2. The unfortunate tendency displayed by Skinner to extrapolate from the thimbleful of knowledge that has been attained in laboratory experiments with animals to human issues of wide significance and social concern is unjustified. This approach has no real support from the results achieved to date: Skinner has declared a program and has not produced a completed body of work on human verbal behavior.

3. With regard to verbal behavior, Skinner is incapable of accounting for the child's acquisition of grammar and for linguistic creativity. Skinner's view of the development of language in the child is marked by dogmatic and quite arbitrary claims based on analogical reasoning from irrelevant experiments.

4. The concepts and procedures of reinforcement theory do not survive the transition from the rigor of the animal experimental laboratory when applied to an analysis of human verbal behavior in a naturalistic environment.

Before turning to an evaluation of these criticisms, it would seem to be advisable to look, briefly, at the explanation of language acquisition and development which Chomsky proposes in place of the interpretations of Skinner.

Chomsky began his work by developing a paper-and-pencil method of analyzing sentences. To this he added rules for 'transforming' or 'generating' various forms of sentences from 'kernel' sentences.

These rules - written as a symbolic code - constitute a 'device' which is in some unspecified way resident in each speaker of a language, constituting his 'competence'.

This is to be distinguished from his 'performance'. The goal of Chomsky's science of linguistics is the description and explanation of this competence - i.e. the knowledge of language possessed by each normal speaker of a language.

Obviously, since Chomsky maintains that a knowledge of linguistic competence is necessary for a knowledge of verbal behavior (used in the traditional linguistic sense), study of a corpus of any finite sample of speech 'performance' (behavior) is inadequate. Linguistics thus becomes a rationalistic science which holds that beyond peripheral behavioral forms there are innate ideas and principles of various kinds which must be explained. Of course, the methods of obtaining information about these inner states are those of introspection and intuition, both of speaker and linguistic analyst. The mental structures of the individual speaker are thus thought to be quite different, in a qualitative sense, from the paradigms developed by behavioral concepts.

Borrowing from the philosophical grammar of Humboldt, Chomsky differentiates between the 'deep' and 'surface' structures of a language. The surface structure of a sentence gives it phonemic

representation, while the deep structure allows for a semantic interpretation of the sentence. Deep and surface structures are related by certain operations of the mind. These are transformational operations, which represent the actual mental operations performed by the mind when a sentence is produced or understood. This fixed system of generative principles is called a grammar. The grammar of a speaker represents his underlying linguistic competence.

Chomsky thus assumes that the child is innately equipped with linguistic competence in the form of a 'language-learning device' which contains 'linguistic universals'. When the child is presented with samples of 'primary linguistic data' (the words and phrases of a particular language) he can construct a grammar which serves the function of coordinating the deep and surface structures of a particular language. When this pairing occurs, language may be produced or understood.

From this brief sketch of Chomsky's theory of language, it seems clear that the first criticism aimed at Skinner - i.e. that no knowledge of behavior can be obtained from studies which deal only with behavior and that such knowledge can be obtained only with an explication of internal structures - is based on Chomsky's acceptance of a 'rehabilitated mentalism' and 'dualism'. The notion of 'internal structures' is not necessarily unscientific if the term refers to

objectively established physiological processes, as observed for example, by Pavlov and others. However Chomsky offers no such data to back his contentions. His focus on deeper underlying principles and abstract mental structures, and his argument that these constitute the field of true science is difficult to accept. The existence of entities such as these must be established objectively before Chomsky can be taken seriously. Furthermore, the 'as-if' nature of these fictitious entities proffers no hope of an insight into possible causal connections in the area of verbal behavior. It has already been stated that the principle of economy does not sanction dualism. The technique of postulating that certain aspects of mental activity will forever remain unobservable (Chomsky, 1959), and yet that they must be postulated to account for human speech-behavior is apriorism to a maximum degree. Science is designed to deal with facts, not with fantasies. In hypostatizing 'mental mechanisms' or 'devices' and speaking of innate abilities, Chomsky pretends to a knowledge he does not have.

Further, the statement, made by Chomsky, that the science of behavior has given us no knowledge of any real significance is simply just not true. One need only compare the work of Thorndike and Skinner with that of Stout and McDougall to appreciate the fallacy of such a statement. While there are still large gaps in our understanding of many of the causes of behavior, it is encouraging that this ignorance

is being reduced by experimental analysis of ever more subtle identifiable variables that control behavior. Even if this were not the case it is impossible to appreciate, (in the light of basic scientific principles) how Chomsky's theoretical stance can be accepted as a promise of 'significant' advances in our knowledge of human behavior.

Many of the same arguments can be used to refute Chomsky's second main criticism that results obtained in the laboratory with sub-human species have little or no relevance to human behavior in the social context. The assumption is that human beings are radically different from other animals (predominately by virtue of their possession of a mind). This is taken to mean that the principles discovered in the study of the behavior of lower animals are quite divorced from the principles operative in human behavior - at best, they apply only to trivial forms of such behavior. Once again, to refute this argument, one need only refer to the many experiments and projects in which modification of human behavior has been achieved by the use of techniques developed in animal laboratories. The supposed 'trivial' nature of such experiments no doubt refers to Chomsky's faith that, although behavior may change, the inner properties of the mind are not affected. It may well be that many variables which are relevant to human behavior remain to be discovered, but at least the experimental analysis of behavior offers a sound scientific basis for such inquiry. In contrast, the 'mentalism' of Chomskyites offers no such foundation. It is rooted in Cartesian

dualism and Kantian agnosticism; not in modern empirical science.

The attack on Skinnerian analysis as trivial is astonishing when one realizes that all of Chomsky's theorizing is based not upon the actual utterances of human beings recorded by linguists - indeed, not upon linguistic literature at all - but upon manufactured collocations. These collocations, being taken out of all context for analysis, can hardly be viewed as legitimate data or as foundation stones for the construction of theories.

The third criticism levelled at Skinner by Chomsky relates to Skinner's alleged inability to account for the child's acquisition of grammar and the phenomenon of 'linguistic creativity'. As indicated by the brief description of Chomsky's theory of language given in the present chapter, grammatical structures or 'internalized strategies for speaking' are basic constructs used in the study of transformational linguistics. This theory which refers to internalizing complex sets of rules or 'plans of speech' may be a possible way to conceptualize the child's acquisition of verbal behavior. However, the inference of an internalized set of grammatical structures is beneficial only if it provides an aid to the thinking of the scientist. If verbal behavior itself shows regularity, such a theory is not required. Skinner (1957) attempts to deal with all of verbal behavior, including those regularities that may lead the grammarian to infer grammatical rules (which then become superfluous in the above sense). Since the internalization

of grammar is a theory about verbal behavior and not a fact, Skinner cannot properly be convicted of failing to account for significant facts because he fails to discuss that concept. An empirical demonstration that a child has learned the rules of grammar would be his exhibiting the verbal performance called 'uttering the rules of grammar'. This performance has never been manifested, without special training.

Further, if the child possessed a knowledge of grammatical rules, why does he most often speak ungrammatically? It is to be hoped that we are not obliged to posit an innate 'incorrigibility' factor to explain this phenomenon.

The claim that Skinner fails to account for 'linguistic creativity' is true only if we accept Chomsky's definition of the linguistic problem. For example, Chomsky's own phrase 'furiously sleep ideas green colorless' may be said to be creative because the words which constitute the phrase appear in a novel sequence - a sequence which Chomsky notes does not conform to the rules of English grammar. In this sense, creativity depends upon the particular unit of language we choose to analyze - in this case a phrase. However, if we select the 'word' as the unit of analysis, there is no reason to consider such an utterance to be creative since each of the words which occur in the phrase are used commonly in the English language. Once partitioned into words, the phrase is readily explicable in terms of the associative explanations of word origins and intraverbal

connections proposed by Skinner.

As for the allegedly dogmatic and arbitrary nature of Skinner's views of language development - it is difficult to understand how the derivation of properties of 'underlying' mechanisms from a paper-and-pencil analysis of sentences, judged to be either 'well-formed' or deviant, exemplifies these qualities to any lesser extent than an extrapolation from bar-pressing.

The real problem of tomorrow for Chomsky, if his analysis of language acquisition is to be assigned any merit, is to discover a connection between innate structure and empirical realities that is sufficiently rich to support his contentions. A recent attempt by Lenneberg (1967) to provide a biological interpretation of Chomsky's theory must be adjudged to be largely ineffective in accomplishing its end.

The final criticism which Chomsky makes of Skinner is most relevant to the study reported in this thesis. It is Chomsky's claim that the terms and methods of reinforcement theory do not preserve the rigor of the experimental laboratory when applied to an analysis of verbal behavior in a naturalistic setting. This criticism completely fails to recognize Skinner's purpose in writing Verbal Behavior. The fact that this manuscript does not offer an account of laboratory experiments in the development and production of verbal behavior, but instead an interpretation of such behavior based on learning principles extrapolated from the laboratory, seems to have escaped Chomsky.

A further misunderstanding arises from Skinner's definition of verbal behavior as 'behavior reinforced through the mediation of other persons'. In other words, Skinner is actually dealing with social behavior, not only in the form of speech but also non-vocal behavior which serves a communicative function. This is quite a different connotation of verbal behavior from that embraced by Chomsky. Chomsky is not concerned with behavior; he works with grammatical rules derived from an analysis of written sentences. For the purposes of his analysis, Chomsky need not, and never does, consider the social context in which speech occurs, nor the repercussions produced by such speech which affect both speaker and listener. Chomsky's analysis is a 'throw-back' to the days of the Port Royal grammarians who in 1660 attempted to discover the enduring universal features characteristic of all languages by means of abstract dissections of the written phrase. He ignores the whole period of "scientific linguistics" from 1786-1925. By neglecting relevant facts established as valid by the sciences of psychology and linguistics, Chomsky finds himself in a position where he must postulate hypothetical entities where none should be needed. Further, since the existential properties of such entities are not properly defined, the danger exists that these can be capriciously assigned ad hoc, as the necessity arises.

If one accepts Skinner's definition of verbal behavior, emphasis being on the social nature and communicative function of such behavior, the relevance of behaviorial principles discovered in the laboratory to this area of study should be obvious. One can hardly ignore the importance

of social variables in the maintenance and development of spoken language. Skinner, of course deals not only with spoken language, but also with gestures which have social communicative value.

Thus the problem presented by "verbal behavior" is not the same for Chomsky as it is for Skinner.

The methods and techniques developed by Skinner in the laboratory obviously have little bearing on the Chomskyian analysis of written language. Skinner can hardly be held responsible for this. The ultimate utility of Skinner's hypotheses concerning communicative behavior will depend upon how productive they are of good experimental research; the validity of his views will be correspondingly lauded or deplored. The sound scientific basis for the functional analysis suggested by Skinner must surely be attractive to the experimental psychologist. The fact that Chomsky seeks to blot out the achievements not only of psychology as it has developed through the twentieth century but the gains of linguistics over a much longer period has a contrary effect. The aim of the present project is seen as an attempt at an experimental evaluation of Chomsky's fourth criticism of Skinner.

CHAPTER 2

RESEARCH METHODOLOGIES

INTRODUCTION AND RESEARCH MATERIALS

In order to carry out a crucial test of Skinner's special hypotheses about verbal behavior and reinforcement principles, it seemed obvious that samples of spontaneous communicative behavior needed to be obtained. The assumption here was that reinforcement is the normal thing, not specially contrived in the animal laboratory - i.e., it explains how people learn and behave in real-life situations. In terms of this requirement the writer's position proved to be extremely propitious. Over the past two years, I had been involved with a number of fellow graduate students under the direction of John McLeish in carrying out research into small group dynamics and processes. During the course of this work a large number of recordings on tapes of "live" (i.e., ongoing, relatively spontaneous) group sessions had been accumulated. These provided the necessary raw materials for an in-depth behavioral analysis which could perhaps enable us to answer the questions to which this thesis is addressed.

It was decided, on the basis of an examination of all this material to concentrate an intensive analysis on three group sessions chosen from the many of which permanent taped records existed. Two of these are group psychotherapy sessions, the other is a session of an instructional learning group. The psychotherapy tapes

originated in connection with a research project funded by Canada Council. This project was aimed at elucidating group processes and learning outcomes in small groups. As part of a larger design, psychotherapy groups were set up, on the assumption that psychotherapy was a learning and behavioral process primarily, and only secondarily a medical matter. We were concerned here with two kinds of therapy - a Tavistock treatment and a Gestalt treatment (see Chaper 3). The clients consisted of psychiatric out-patients from the Royal Alexandra Hospital in Edmonton. Sixteen individuals were randomly assigned to one or other of the treatment groups. Each group ran for twenty one-hour sessions in April, 1972 meeting each week-day evening for one hour, with weekends free. All sessions were observed by a team of graduate students, two of whom coded the "live" interaction using Bale's Interaction Process Analysis (cf. Bales, 1950 and 1970). This activity, which provided an objective descriptive account of the group behavior, proved to be extremely valuable as a forerunner to the development of the coding techniques used in the present project.

Following the group treatments, comprehensive written transcripts of all forty sessions were made. These detailed the communicative interaction in the group sessions so that the methodologies reported later in this chapter could be implemented.

Of the forty audio and video tapes taken of the two group treatments, only two were selected for detailed analysis. These

were the recordings of the first session of each treatment. Chaper 3 deals in detail with the findings for these two sessions.

The third group, considered in Chapter 4, also originated in the winter of 1972. At that time John McLeish set up a series of learning groups in connection with a graduate seminar in learning and research. To enable students to gain first-hand knowledge of the learning process as it operated in a small group setting, they were given the opportunity of systematically observing (with the aid of various systems of interaction analyses, or from a particular theoretical orientation) the interactions of freshman subjects engaged in learning a specific task during the course of a forty-five minute group session. Seven group sessions (different group membership each time) were set up for this purpose, with various members of the graduate class sharing the instructional duties. As a result, many different teaching styles were analyzed and discussed. While the method of instruction, and the composition of the group, varied from session to session, the task was always the same. On each occasion it was the objective of the instructor to train the students in skills related to the communication of empathy and to show this skill as it might be utilized in an educational setting. The tape selected for analysis was of the third session. The group on this occasion consisted of 8 group members and an instructor. The instructional technique used, and the findings for this group, are outlined

in Chapter 4.

CODING SYSTEMS AND TECHNIQUES

Before proceeding with an analysis of reinforcement principles in relation to the verbal content recorded during the three taped sessions described above, some useful and convenient means had to be developed to simplify and quantify the wealth of verbal material available. Since the main theoretical questions of the project were closely connected with the work of B.F. Skinner, especially his Verbal Behavior (1957) it was decided to incorporate the verbal operants as categorized by him in the attempt to account for human interaction behavior. Skinner's system of verbal operants is really an hypothesis about the operation of causal laws which control human social (verbal) behavior. Adopting a functionalist approach, and basing his arguments on rigorous experimental work in the area of animal behaviors, Skinner sets himself the task of analyzing the multitude of discriminative and reinforcing stimuli which control the emission of verbal behavior. By citing examples from literary sources and natural observations he develops powerful and consistent arguments for several kinds of verbal behavior in terms of the tri-member sequence or contingency (stimulus → response → reinforcer) of the operant paradigm. The verbal operants derived in this manner were incorporated in the present project (with slight modification) as a category system of

interaction analysis. This system formed the basis for a functional analysis which would hopefully account for communicative behavior in the context of the small group.

Actually, two such systems of interaction analysis were developed. The first consists of eight verbal operants, the second is very similar, but with the addition of two new category areas (see Table I). In both systems, categories one to five are taken directly from Verbal Behavior with no major revisions. They serve the same purpose in the interaction analysis as Skinner outlines. However, the remaining categories in each of the two systems do not correspond exactly to Skinner's formulations. The general verbal operant which he calls the autoclitic is the source of these last categories, but the break-down of this operant into several less inclusive, more specific categories differs from the original definitions. Whereas Skinner speaks of descriptive, assertive and grammatical autoclitics, our category system codes controlling, affective, and informative autoclitics. The decision to modify the autoclitic subdivisions was partly pragmatic and partly, theoretical. From a pragmatic standpoint it was discovered that Skinner's break-down resulted in a large number of autoclitics being coded as descriptive, with very few occurring in the other two areas. The break-down finally decided upon resulted in a more even distribution of acts across the autoclitic categories. From a theoretical standpoint, the final sub-division facilitates comparison between the functional analyses reported in Chapters 3 and 4, and the structural analyses based on other systems of interaction analysis which typify small

TABLE I: VERBAL OPERANT CATEGORIES

1. Mand
2. Tact
3. Extended Tact
4. Echoic
5. Intraverbal
6. Autoclitic (Dominant Control)
7. Autoclitic (Negative Affective)
8. Autoclitic (Informative)
9. Autoclitic (Submissive Control)
10. Autoclitic (Positive Affective)

6 → 6, 8, 9
7 → 7, 10

Categories 6 and 9 form category 6 (Control Autoclitic) in the eight-category system. Categories 7 and 10 form category 7 (Affective Autoclitic) in the eight-category system.

Operant-Categories	Definitions	Examples of Behaviors Included
1. Mand	A verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation.	Vocal 1. "Can you tell me what your name is?" 2. "Forget about that." 3. "Let's stop avoiding the task." Non-Vocal 4. Questioning glances. 5. Directing gestures of command, etc.
2. Tact	A verbal operant in which a response of given form is evoked (or at least strengthened by the physical presence of a particular object, or event, or property of an object or event.	Vocal 1. "His chair is vacant." 2. "The group is anxious." 3. "Here, in this room." Non-Vocal 4. Any anxious acknowledgement of an object or physical activity referred to in the non-vocal gestures of a speaker.

3. Extended Tact	A verbal operant in which a response is generated by physical properties of objects and events, and the association between verbal behaviors and the physical properties are not commonly reinforced by a particular verbal community.	Vocal 1. "It's a bloody morgue." (referring to the group situation). 2. "The preacher said so." (referring to the group leader). Non-Vocal 3. Ritualized bowing to the group leader. (The gestures are not entirely appropriate to the physical object actually present.)
4. Echoic	A verbal operant in which the response is under the control of verbal stimuli such that the response has formal properties precisely the same as the stimulus.	Vocal 1. Any spoken repetitors. 2. Laughter after the initial burst of mirth. Non-Vocal 3. Modelling of postures, gestures, etc.
5. Intraverbal	A verbal operant in which the response is thematically related, but shows no point-to-point correspondence to the verbal stimulus.	Vocal 1. "We have certain expectations." (follows upon "The group is waiting for something to happen.") 2. "We share a few laughs." (Part of an anecdote about friends.) Non-Vocal 3. Stretching and yawning. (Behaviors occur during a monologue on fatigue.)
6. Dominant Control Autoclitic	A verbal operant which is based on or depends upon other verbal stimuli which calls attention to the speaker or what he is saying.	Vocal 1. "Now." 2. "So." 3. "Well ah'm" Non-Vocal 4. Leaning forward or back in chair (attention getting). 5. Pausing for effect.

7.	Negative Affective Autoclitic	A verbal operant which is based on or depends upon other verbal stimuli which indicates a negative emotional reaction to what has been said.	Vocal 1. "No fear!" 2. "I doubt it very much!" Non-Vocal 3. Cutting across the flow of communication with a disruptive gesture. 4. Looking away from the speaker. 5. Clicking a cigarette lighter.
8.	Informative Autoclitic	A verbal operant which is based on or depends upon other verbal stimuli which clarifies or alters its effect but does so without any indication of emotion.	Vocal 1. "I see where. . ." 2. "On the other hand." 3. "However, it could be" 4. "I wish" etc. Non-Vocal 5. A shrug which accompanies the word "confusion". (Dramatizations and gestures which clarify other verbal behaviors).
9.	Submissive Control Autoclitic	A verbal operant which is based on or depends upon other verbal stimuli which indicate passive acceptance.	Vocal 1. A bland "yes". Non-Vocal 2. Attentive listening postures. 3. Direct and continuing eye contact with speaker.
10.	Positive Affective Autoclitic	A verbal operant which is based on or depends upon other verbal stimuli which indicate a positive reaction to what has been said.	Vocal 1. "I agree." 2. "Definitely." Non-Vocal 3. Smiling. 4. Nodding. 5. Laughing at a joke, etc.

group research (cf. Anderson 1971, Matheson, 1971; and Bedecki, 1972). Most major research-workers in this area agree that the interaction in small groups can be described in terms of a three-dimensional space constructed around three central axes of power, affect and task (cf. McLeish et al., 1972, pp. 116-117). By breaking down the overall autoclitic operant into control (power), affective (affect) and informative (task) autoclitics, a tie with the work of these research reports was maintained.

The difference between the eight-category and the ten-category systems of interaction analysis also involves the subdivisions of the autoclitic break-down. The controlling and affective autoclitic operants of the eight-category system were further divided to produce two new operant areas which are included in the ten-category system (see Table I).

In addition to the two coding systems, two sets of rules were used in coding. The first is comparable to that used in Bales' Interaction Process Analysis. In this system all the acts emitted by all the group members are coded as they are recognized. While it was determined that on the average, one act should be coded every second, the coding rate was not rigidly controlled. The second method allows for the coding of the beha vior of each individual separately. In other words, the total interaction of an eight member group is coded in eight separate viewings of the tape - one for each individual. The rate of coding using this second technique was rigidly controlled with one behavior for each individual being coded every three seconds. The

second method of coding, as compared to the first, ensures that an equal number of acts are coded for each individual. It should be noted that in both coding techniques the observer scores both the category in which an act occurs, and the person who emits that act. Since the individuals in a group are given numbers, it is usually a simple matter to write two numbers,or to make a mark on pre-constructed people-by-category matrix sheets. While Bales' system of interaction analysis codes the person to whom an act is addressed, this information was not coded using the present techniques.

The two psychotherapy group sessions, were coded using the eight-category system and the 'all-at-once' coding techniques. The learning group session was coded with the ten-category system and the 'one-at-a-time' coding technique. Since all the coding was done with the aid of audio and visual tapes which could be stopped and run at will, and since written transcripts of the interaction were available for simultaneous consultation, consistently high inter-observer reliabilities were obtained over the course of the observer training period. Using Scott's coefficient of reliability (cf. Flanders' 1964, p. 13) figures of .80 and above were consistently reached.

Before leaving this section, it should be made clear that acts coded in these two systems are not coded according to any formal or structural properties. It is the relationship which a particular unit of behavior has to the units of behavior immediately preceding and succeeding it which is coded. Each piece of action is viewed as having a particular

function. The same formal act may have many different functions depending on the circumstances under which it occurs. (Specific rules and conventions for coding may be found in Appendix 1). Each of these different functions are coded in different category areas. The goal of the analyses outlined in the remainder of this chapter is to determine whether or not these functions are causally determined by principles of reinforcement, as Skinner hypothesizes they are.

THE DEVELOPMENT AND USE OF COMPUTER PROGRAMS

Once the three group sessions (two psychotherapy and one learning session) had been coded, the codings were transferred onto IBM computer cards and analyzed by a sophisticated computer program developed specifically for that purpose. The computer program consists of several stages which were implemented in chronological sequence as the project unfolded. The first part of the program produces simple cumulative frequency tables which tally all the acts emitted by each group member over all the category areas as they accumulate over selected time intervals. A separate table is constructed for each member of the group. The uniform time intervals chosen for the tables are arbitrary but cannot exceed a total of 60 for any one session. The end of one such interval and the beginning of another is signalled by the simple procedure of punching four zeros on the IBM cards at the end of each time segment.

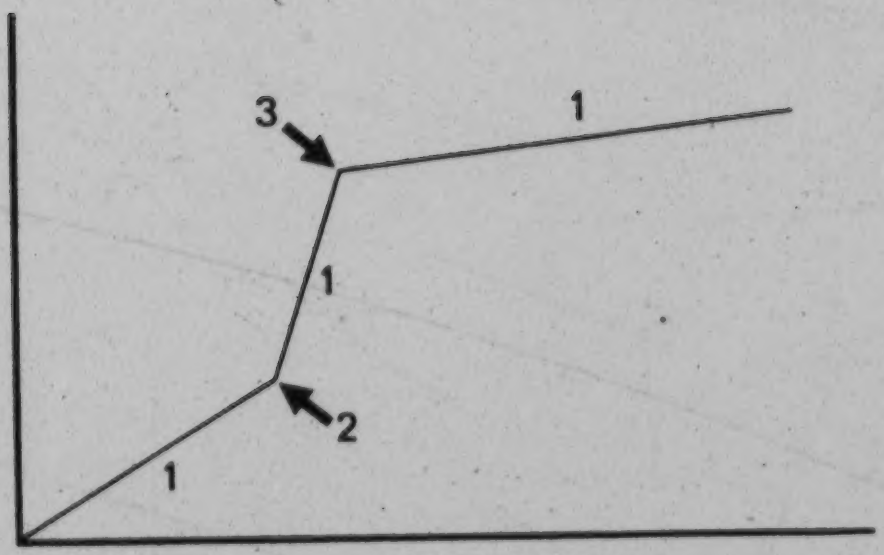
The second part of the computer program prints cumulative record curves for each operant emitted by each participant. Anyone familiar with the experimental work of Skinner and others will realize that this transforms our data into the form in which rate of responding is reported from animal laboratories. The abscissa of the graph is the time continuum, the ordinate consists of a continuum of total frequency counts. The slope of the graph indicates rate of emission or rate of responding. From these graphs it is obvious

at a glance when learning (increase in slope), 'unlearning' (decrease in slope), or non-learning (constancy of slope) are occurring. These constitute our operational definitions of the learning process (see Figure 1).

The third and fourth parts of the computer program are concerned with isolating particular preceding or succeeding acts which occur with regularity before or after operant emissions during periods of operant increase or decrease. Taking each operant as the middle term in a three-term contingency of reinforcement (stimulus -- operant response -- reinforcement) the final stages of the program are given the task of determining, within certain rigid specifications and limits, the remaining two terms - i.e., stimuli and reinforcements. Tally tables of the acts which precede or succeed any emissions of the operant (up to a maximum of 10 acts) being considered during the periods of operant increase (To be considered as an interval of increase the interval in question must contain at least three more emissions of the operant being studied than the previous interval. This decision is entirely arbitrary and pragmatic.) are printed below the cumulative graphs. These tables are then further analyzed to determine which persons are emitting the acts which seem to have stimulus or reinforcing properties. When an act emitted by a particular individual shows a perfect preceding or succeeding correlation, it is isolated as a discriminative, or as a reinforcing, stimulus. In other words, every emission of the operant being studied during a period of increase must be preceded or succeeded by acts belonging to a particular operant before this operant is considered as a stimulus or a reinforcer.

FIGURE 1

ILLUSTRATION OF LEARNING AS
OPERATIONALLY DEFINED



Learning occurs in interval marked 2

Unlearning occurs in interval marked 3

Non-learning occurs in intervals marked 1

METHODS OF ANALYZING THE PSYCHOTHERAPY GROUP SESSIONS

As previously indicated the two psychotherapy sessions were coded using the eight-category system of interaction analysis and the "all-at-once" coding technique. On the average, one act was coded every second. Since the two groups analyzed ran for one hour each, something in the neighbourhood of 3,600 acts were coded for each group session.

At an early stage in the analysis of the codings which represented the communicative interaction of the psychotherapy groups, the computer program outlined above was not employed. Indeed, the first results reported in Chapter 3, were determined by a simple theme analysis of the transcribed dialogues. After dividing each group session into two-minute intervals, the transcripts were scanned to determine the most salient themes which unfolded in each of these intervals. It was initially hoped that such a thematic survey would eventually throw some light on verbal stimulus situations which were associated with particular classes of behavior. This hope proved to be ill-founded largely due to the roughness of the analysis of themes. Nonetheless, the theme analyses provided good summary pictures of the group interactions.

Once the computer program was put into operation, traditional statistical procedures were employed to analyze further the cumulative tables generated by the first stage of the computer analysis. Differences in the total frequencies of acts between the two treatments, between individual group members, and between the different category areas themselves were tested

for statistical significance through the use of standard analysis of variance programs.

Once both general and statistical impressions of the data had been obtained the final stages of the computer program, developed for the purpose of analyzing the coded operants, were implemented. The parameters used in this analysis were selected on a trial-and-error basis, the final criteria for selection being quality and quantity of information elicited. The results reported in Chapter 3 are based on an analysis of thirty two-minute time intervals. Ten acts (10 second periods) were analyzed before and after each emission of the operants which showed increases in their rates of emission.

METHODS OF ANALYZING THE LEARNING GROUP SESSION

The method of analysis of the learning group differed from the analysis of the psychotherapy groups in several vital particulars. As already indicated, the coding instrument and coding technique employed were different for the two types of groups. Another main difference concerns the focus of attention of the respective analyses. In the case of the psychotherapy groups we focused on establishing the functional relationships between stimuli, responses and reinforcers to account for only the periods of increasing operant emission. On the other hand, the analysis of the learning group focused on providing a dynamic model of the operation of reinforcement principles to account for the overall emission history of particular

operants during the entire experimental period. This latter goal is concerned with explaining periods of operant decrease and constancy as well as periods of operant increase. The decision to proceed in this manner represented our concern that the analysis be comprehensive enough to provide a picture of the group interaction at all times - not just during periods of operant increase.

A final difference between the psychotherapy analysis and that of the learning group is the length of the experimental period. While the complete psychotherapy group sessions were analyzed, only fifteen minutes of the learning group were coded and studied. Because of the more in-depth scrutiny of the learning group codings it was decided to sharpen the time-interval parameters from two minutes (psychotherapy groups) to 30 seconds (learning group). With a 30 second time interval, a period of fifteen minutes resulted in a total of 30 such intervals - a figure comparable to the 30 two-minute intervals coded for the psychotherapy groups. The smaller time interval had the effect of increasing the precision of the computer analysis.

To facilitate comparison between the two types of groups, the learning group was first analyzed in a manner similar to that used on the psychotherapy groups. General contingencies of reinforcement which accounted for the periods of operant-increase were drawn from the computer output. The computer program was then slightly altered to extend the analysis of preceeding and succeeding acts to

periods of operant decrease and constancy. The results of this procedure are given in detail in Chaper 4.

A GENERAL STATEMENT OF FINDINGS

As a result of the implementation of the methodologies outlined in earlier parts of this chapter certain general conclusions have been reached in terms of the overall objectives of the project. While more specific conclusions and findings will be dealt with in later chapters, the following general principles appear to be valid:

(i) The verbal operant categories, conceived by Skinner, satisfactorily describe all communicative behavior in the groups we have observed. No behaviors remain uncoded and behavior is emitted in all categories.

(ii) The basic principles of the experimental analysis of behavior, and the concept of contingencies of reinforcement account for all increases or decreases in the rate of emission of the operants in the eight or ten category areas in the small group situation. This is to say that functional relations were discovered between the verbal operants and that the learning process, as operationally defined, was explicable in terms of these causal chains.

(iii) The principle of causality seems to hold for the relatively "spontaneous" behavior of human subjects in both a relatively unconstrained and in a more structured group situation. When verbal operants increase in their rates of emission, it is possible to discover reinforcement contingencies which account for these increases. When no increases are shown, no reinforcement contingencies can be discovered (cf. J.S. Mill: A System of Logic, 1843).

These hypotheses were tested by means of specific research methodologies and sophisticated computer programs. The attempt has been made to ensure the objectivity of the analyses by replication of observations by different observers, and by using the appropriate reliability statistics.

CHAPTER 3

CONTINGENCIES OF REINFORCEMENT IN TWO PSYCHOTHERAPEUTIC GROUP SESSIONS

BACKGROUND

The present chapter is devoted to the description of the dynamic learning processes operating in two psychotherapeutic group sessions of sixty minutes each. These are the first sessions in two group therapy treatments which ran for twenty sessions each. The techniques and methodologies outlined in Chapter 2 were applied in a systematic way to the behaviors emitted in these two group sessions. The participants in one group were exposed to a Tavistock therapy while the members of the other group received a form of Gestalt therapy.

The method of group therapy developed at the Tavistock Clinic and Institute of Human Relations in London, England is a form of group psychoanalysis. The behavior generated in the group is interpreted by the group leader or trainer in terms of unconscious processes, especially making use of Freud's theory of the 'primal horde', Oedipal conflicts, and Freudian constructs in general. The attention of the group is focused on the 'here-and-now' situation with the task of observing and understanding behavior as it happens. The trainer plays the role of a non-participant observer who reflects back into the group the latent messages, unconscious content and

dynamic group processes which lie behind the overt behavior of the group members. As a non-participant, he is used by the group as a kind of blank screen onto which the members of the group project their conflicts, especially in relation to introjected images of authority. It is intended that the latent content of behavior should become clear to the participants as a result of the insights gained into their own emotional responses to the trainer and his interpretations. Unconscious processes stand revealed in the public domain: this is the special and unique facility provided by this treatment.

The Gestalt approach to group therapy has received much attention in recent years, owing mainly to the work of the late Fritz Perls in California, U.S.A. Generally it is a much more structured and directive approach than the Tavistock method. The trainer acts both as participant and observer. His task is to make the group participants aware of their behavior (especially their affective behavior) in the current group situation. This is usually accomplished through the implementation of a number of highly structured roles, principles and simulations of the group dynamic. The actual format decided upon is usually specific to each group leader, although certain techniques and strategies such as the 'I and thou' emphasis and the 'here and now' principle have achieved wide acceptance. A sound emotional base is considered to be critical to healthy functioning; any internal conflict or polarization is thought to lead to low-level functioning. Through

increased awareness, the participant is able to 'unfreeze, re-structure, and re-freeze' his 'Gestalten' or perceptions of reality. Thus, the resolution of internal conflict through awareness is the ultimate goal of all Gestalt therapies.

ANALYSIS OF THEMES

At an early stage in observing video and audio tapes of the two psychotherapeutic sessions with which the present chapter is concerned, it was decided to divide the sessions into two-minute time intervals and to note the salient themes discussed by the participants in each of these intervals. Tables I and II summarize the information disclosed by means of this simple procedure which deals only with the manifest content of the group interaction. The precise time taken for the two sessions varied slightly, with the Tavistock group running for 58 minutes and the Gestalt group for 60 minutes. As a result, 29 two-minute intervals were analyzed for the Tavistock group and 30 two-minute intervals for the Gestalt group.

Because of the subjective nature of this analysis of themes, it would not be very profitable to discuss Tables I and II in detail. However certain general patterns are present which sensitize the research worker to the overt behavioral reactions of the group members and which help to generate hypotheses to be tested by a

TABLE II

THEME ANALYSIS OF TAVISTOCK SESSION 1

Orientation to Task		4 minutes
Introductions		2 minutes
Inadequacy		4 minutes
Depression - Trainer's role		2 minutes
Inadequacy		2 minutes
Depression - Inadequacy		2 minutes
Depression - Katie's Problem		2 minutes
Katie's Problems -	Inferiority	16 minutes
	Mother-in-law	
	Family	
Trainer's Role - Depression		2 minutes
Depression - Lonely Male		2 minutes
South Africa - Travel		2 minutes
South Africa - Racial Problems		2 minutes
Racial Problems - The Sexes		2 minutes
The Sexes		4 minutes
Depression - Manipulation		2 minutes
Depression - Lilly's Problems		2 minutes
Lilly's Problems		6 minutes

TABLE III

THEME ANALYSIS OF GESTALT SESSION 1

Expectations - Inadequacy	2 minutes
Introductions - Expectations	2 minutes
Problems	2 minutes
Shyness - Leadership	2 minutes
Inadequacy	2 minutes
Inadequacy - Problems	2 minutes
Withdrawal - Inadequacy	2 minutes
Orientation to Task	2 minutes
Inadequacy - Problems	2 minutes
Lonliness - Superficiality	2 minutes
Superficiality	2 minutes
Friendships - Sharing Confidences	2 minutes
Sharing Problems - Family & Friends	2 minutes
Family & Friends	2 minutes
Making Decisions - Self Confidence	2 minutes
Self Confidence - Withdrawal	2 minutes
Lonliness	2 minutes
Loneliness - Non-verbal behavior	4 minutes
Children & Babysitters	4 minutes
Children & Babysitters - Lack of Accomplishment	2 minutes
Lack of Accomplishment - Trust	2 minutes
Trust - Problems	2 minutes
Trust - Group Limits	2 minutes
Sharing Problems	2 minutes
Sharing Problems - Group Limits	2 minutes
Common Ground - Problems	2 minutes
Problems - Group Limits	2 minutes
Group Limits - Problems - Accomplishments	2 minutes

more detailed and sophisticated analysis. While there are certain similarities in themes as between the groups, the Tavistock content deals more with specific group members than does the Gestalt. For example, there is a recurring Tavistock theme which can be labelled 'Katie's Problems'. Katie as a person, is the focal point of overt verbal content. Thirteen of the 29 Tavistock two-minute intervals refer to this whereas only one of the 30 Gestalt time periods displays this kind of individual reference. Upon closer examination of the tape records it was observed that during these individually-specific theme intervals vocal group interaction was at a very low level. Put another way, one dominant speaker held the floor during these intervals, and did so almost without interruption from other group participants. In the Tavistock group it was often possible for one individual to introduce a particular theme and proceed to embellish it through a progression of individual anecdotes and personal opinions. Generally the content of speech during these sessions was at a concrete level and dealt amost exclusively with past incidents. In contrast, the members of the Gestalt group rarely allowed one member vocally to dominate the group interaction. If an individual introduced a theme, other members joined in to extend and develop it. Consequently, the content was not made up of predominately concrete anecdotal material from individual pasts. Thus, more than one member was involved in the development of a theme and the interaction tended to take on a more

abstract, not to say philosophical quality. Any anecdotes which did occur were used as illustrations of particular "philosophical" positions. The themes and anecdotes were not communicated as ends in themselves, to relieve tension and discharge emotion but to illustrate a point of view.

The second observation drawn from the theme analysis is that the general affective tone of the two groups differs considerably. Recurring themes of depression and "manipulation" inject the Tavistock group with an ominous negative affective quality. This depression and negativism is not present to the same extent in the Gestalt group. As noted previously, the emphasis in the latter group is on more cognitive, more abstract, intellectualizing. Subject matter treated in this way tends to be less threatening or depressing. The seemingly pointless anecdotal material endemic in the Tavistock interaction may serve the function of sublimating angry, frustrated and disappointed feelings. At any rate the Tavistock interaction oscillates between a sort of house-wife "show and tell" time and periods of depression and frustration.

Taken together, the observation of the two first sessions leads to the formulation of several hypotheses concerning the learning processes operative in the two groups. The more cooperative and interactive character of the Gestalt group may point to a high level of positive reinforcement operating therein. In this group, people tend to talk because they are positively reinforced for doing so.

The general depressive mood of the Tavistock group seems to indicate that talking is negatively reinforced insofar as it defers or leads to escape from, intervals of overt frustration and anger. People tend to talk in this group because their speech negates periods of uncomfortable, non-supportive silence and tension - at least this is the preliminary hypothesis about it.

To determine the validity of these explanations, and to account more precisely for the functional roles of specific individuals and specific verbal acts, the detailed methods of analysis already outlined in Chapter 2 were utilized.

DESCRIPTIVE ANALYSIS OF VERBAL INTERACTION

To begin a finer series of analyses, the behaviors emitted during the two sessions were coded according to the eight-category system of interaction analysis developed from Skinner's Verbal Behavior (see Table I). Before examining functional relationships, traditional descriptive statistics were employed to draw out a summary picture of differences in the use of verbal operants as between individual group members, between treatments and between the categories themselves. Appendix 2 indicates the frequencies with which each verbal operant was emitted by each group member for each of the two sessions. Total figures and conversions to percentages of total interaction are also included.

A series of analyses was run on these data to determine the significance of various factors in terms of their contribution to the overall variance of the frequency counts. Tables IV and V show the results of two two-way analyses of variance. Treatments and categories are the factors for the analysis associated with Table IV Treatments and people are the factors for Table V. TableVI is a summary of the results from eight one-way analyses of variance which tested the significance of treatment differences for the emission frequencies of each of the verbal operants which comprise the category system.

Using the 5% level as a criterion for significance, the two two-way analyses of variance show that differences between categories and differences between individual group members contribute significantly to the overall variance of the frequency counts. While there are significant differences between categories in terms of the number of emissions of particular operants over all group members, and significant differences between individuals in terms of the total number of verbal operants emitted, there is no significant treatment effect. In other words, the total number of verbal operants emitted in the Gestalt group does not differ significantly from the total number of verbal operants emitted in the Tavistock group. Further, no significant interaction effects were noted between treatments and people or between treatments and categories.

To determine significant differences between groups with respect

TABLE IV

TWO-WAY ANALYSIS OF VARIANCE TABLE -
TREATMENTS X CATEGORIES

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F RATIO	PROBABILITY
Treatments	6,670.13	1	6,670.13	1.99	.1608
Categories	72,363.60	7	10,337.70	3.09	.0051*
Interaction	4,082.75	7	583.25	.17	.9900
Error	374,755.00	119	3,346.03		
TOTALS	457,871.48	124	-	-	-

TABLE V

TWO-WAY ANALYSIS OF VARIANCE TABLE -
TREATMENTS X PEOPLE

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F RATIO	PROBABILITY
Treatments	6,670.13	1	6,670.13	3.41	.0676
People	217,881.00	7	31,118.7	15.89	.0000*
Interaction	13,973.60	7	1,996.23	1.02	.4218
Error	219,397.00	119	1,958.90		
TOTALS	457,871.73	124	-	-	-

to the emission of particular operants in specific verbal categories the eight one-way analyses of variance reported in Table VI were run. No such differences were found; the general conclusion is that the two groups did not differ significantly from each other in their use of particular verbal operants nor in their total emission of verbal behavior.

The results of the analyses of variance are certainly not surprising. Vast differences existed in the output of verbal behavior by individual group members. In the Tavistock group Katie emits 1,265 verbal acts as compared to 28 emitted by Carol In the Gestalt group Fritz's 1,177 acts far surpass the 73 acts emitted by Jo. Although Katie and Fritz speak much more than do Carol and Jo, vocalizing is not the sole explanation for these discrepancies. The coding system scores non-vocal as well as vocal communicative acts. With this in mind it seems likely that even the non-vocal communicating behavior of Katie and Fritz would be quantitatively much greater than that of Carol and Jo respectively. This conclusion gains face validity from the tape-recordings themselves. Fritz and Katie continually edit the comments of their respective group colleagues with head movements, eye contacts and expressive facial gestures, whereas Jo and Carol not only don't speak themselves, but don't become involved in the speech of others.

The significant difference between categories in terms of the emission of verbal acts by the group as a whole is also obvious

TABLE VI

SUMMARY OF
ONE-WAY ANALYSES OF VARIANCE -
TREATMENT DIFFERENCES FOR 8 VERBAL OPERANT CATEGORIES

VERBAL OPERANTS	SOURCE	SUM OF SQUARES	D.F.	MAN SQUARES	F RATIO	PROBABILITY
MAND	Treatments	1,089.00	1	1,089.00	1.85	.1947
	Error	8,220.00	14	587.14		
TACT	Treatments	961.00	1	961.00	1.77	.2050
	Error	7,612.75	14	543.77		
EXTENDED TACT	Treatments	333.06	1	333.06	.61	.4481
	Error	7,655.87	14	546.85		
ECHOIC	Treatments	625.00	1	625.00	.26	.6183
	Error	33,705.00	14	2,407.50		
INTRAVERBAL	Treatments	2,162.25	1	2,162.25	.38	.5471
	Error	79,517.50	14	5,679.82		
CONTROL AUTO-CLITIC	Treatments	1,314.06	1	1,314.06	.20	.6597
	Error	90,901.38	14	6,492.95		
AFFECTIVE AUTO-CLITIC	Treatments	2,862.25	1	2,862.25	1.34	.2660
	Error	29,845.50	14	2,131.82		
INFORMATIVE AUTO-CLITIC	Treatments	1,406.25	1	1,406.25	.17	.6882
	Error	117,297.50	14	8,378.39		

OB

(see Appendix 2). In the Tavistock group an upper extreme of 610 acts are emitted in the informative autoclitic category, while the lowest rate of emission is found in the tact category where 157 verbal acts are recorded. The same kind of spread is found in the Gestalt group: 784 affective autoclitic acts are emitted as compared with 229 acts scored in the extended tact area. For both groups categories one, two and three record lower rates of emissions than do categories four to eight. This is not surprising given the nature of each of the eight verbal operants as described in Table I. Categories four to eight include repetitions, extensions of themes, and linking or controlling verbal acts, all of which occur at a high frequency in non-structured verbal interaction. Categories one to three include such things as commands, questions, admonishments and references to the physical structures of the immediate environment. Although these categories code the real substance of human communication they do not tend to occur as frequently as the chains of elaborations, extensions, agreements and disagreements which they inevitably produce.

The non-significant group difference reported by both the one-way and two-way analyses of variance could also have been predicted from Appendix 2. Nowhere between groups do we find the extreme differences in rates of emission which typified the between-people and between-category differences. Even the difference in total verbal acts emitted by the Tavistock group (3,194) as compared with

the Gestalt group (4,001) is not significant at the 5% level. Further, the percentage break-down of the total group interaction across all eight verbal operant-categories is remarkably similar for the two groups. This finding lends face validity to the randomizing procedure used to select subjects for each of the group treatments. Because the two sessions with which this analysis is concerned were the first sessions in the respective treatment programs any expectation of treatment differences at this stage would no doubt be premature. Further the differences which were anticipated in trainer behavior between groups was somewhat mitigated by the necessity for certain common first session activities such as introductions, orientation to task, outline of treatment and obligations etc. Another confounding factor was the first session behavior of the Gestalt trainer. Because of some inexperience and initial nervousness, the Gestalt therapist did not fall immediately into his specified role, but in fact behaved very much like the Tavistock trainer. The fact that no group differences appeared with respect to frequency of emission of verbal behavior, for these first sessions is no doubt determined by a combination of the above factors. It is believed that this finding would not be sustained if the other sessions of the two treatments were compared.

FUNCTIONAL ANALYSIS OF CONTINGENCIES OF REINFORCEMENT

As stated in previous chapters, the main purpose of the project reported in this thesis is to study the behavior of individuals in a small group from a functional standpoint. Having described the structural features of the behaviors, it is now necessary to search for the possible causal connections between various acts emitted by an individual and those which precede or follow these operants. Accepting the basic principles of Skinner's theory of operant conditioning and reinforcement, this means that each operant category must be viewed as the middle term in a three-term contingency of reinforcement. According to theory, if a particular operant for a particular individual increases in its frequency of emission it must be reinforced by another verbal act or combination of verbal acts. Similarly, it should be possible to determine preceding acts which become associated with the operant response and its reinforcement, acting as discriminative stimuli for the operant in question. While this process illustrates learning as a result of positive reinforcement, it is also necessary to be aware of learnings, i.e., increases in rates of emission, which result from negative reinforcement. If a particular preceding act or combination of acts decreases in rate of emission while the operant being studied increases, and this occurs in a uniform and consistent manner, the decrease associated with the preceding act(s) may be viewed as negatively reinforcing the

operant-response.

Using the systematic program of controls, analyses and computerizations of codings delineated in Chapter 2, it was possible to arrive at contingencies of both positive and negative reinforcement which accounted for all the learnings which occurred in the first sessions of the Gestalt and Tavistock treatments. Tables VI and VII summarize these contingencies for all the group members. Only those operants which increased in rate of emission are included in these tables. If an operant is omitted, this indicates that the frequency of emission of the operant-response in question did not increase or decrease, but stayed at a constant level. In other words, since no learning occured in these cases, no contingencies of reinforcement were operative.

It should however be reiterated that these periods of no learning served a vital function in terms of the overall design of this study in that they acted as controls for those cases where movements did occur. Since no preceding or succeeding acts were found to be associated with the 'no-movement' operants, the finding that operants showing fluctuation in emission rates are reinforced indicates a causal relationship. In terms of the overall question to which the present work is directed, it can be stated that the basic principles of learning through reinforcement, as outlined by B.F. Skinner, do account for, and functionally explain the learning processes which operate in a naturalistic human

TABLE VII

CONTINGENCIES OF REINFORCEMENT OPERATIVE IN TAVISTOCK SESSION 2

SYMBOLS - Letters indicate the group members:

R = Ron	E = Ellen-Ann
L = Lois	Li = Lilly
K = Katie	N = Nancie
C =	T = Trainer

Numbers indicate the verbal operants:

1 = mand	5 = intraverbal
2 = tact	6 = control autoclitic
3 = extended tact	7 = affective autoclitic
4 = echoic	8 = informative autoclitic

Arrows (⟶) link the verbal operants in a causal, temporal chain of the form:

Discriminative Stimuli ⟶ Response ⟶ Reinforcement

R ON

(positive reinforcement)

Echoic:	K.8 T.8 ⟶	R.4 ⟶	K.7 K.4
Intraverbal:	R.K.N interaction * ⟶	R.5 ⟶	R.7 N.7 K.7
Control Autoclitic:	R.K.N interaction ⟶	R.6 ⟶	K.8 R.8
Affective Autoclitic:	R.4 K.8 N.4 ⟶	R.7 ⟶	K.4 R.7
Informative Autoclitic:	R.K interaction ⟶	R.8 ⟶	R.4 R.7 N.4 N.4

(negative reinforcement)

Informative Autoclitic: T.8 ⟶ R.8 ⟶ no T.8

R on's verbal behavior is largely self-stimulated and self-reinforced. In addition to this self-stimulation, the verbal operants of Nancie and Katie exert extensive control. Ka tie's echoic behavior seems to be especially reinforcing. On the negative side of things, the withdrawal of informative autoclitic behavior by the Trainer negatively reinforces similar behavior by Ron.

* Any combination of verbal acts by these three people constitutes the stimulus situation.

LOIS
(positive reinforcement)

Affective Autoclitic: N.7 K.7 → L.7 → (N.5 / K.5) (N.7 / K.4)**

Lois is a non-vocal participant in the Tavistock session. Only one of her verbal operants shows an increase in its rate of emission: her affective autoclitic operants are stimulated and reinforced by Nancie and Katie.

KATIE
(positive reinforcement)

Mand:	K.2 K.5 K.7	→ K.1	→ (K.7) (N.6 / K.6)
Tact:	K. talk ***	→ K.2	→ K.1 K.6
Extended Tact:	K.4 Li. 7 K.8	→ K.3	→ Li. 8 K.8
Echoic:	K. talk	→ K.4	→ K. talk
Intraverbal:	K.6 K.8	→ K.5	→ K. talk
Control Autoclitic:	K.4 K.8	→ K.6	→ K. talk
Affective Autoclitic:	K.3 R.4	→ K.7	→ K.4 K.7
Informative Autoclitic:	K.6 K.5	→ K.8	→ K. talk

(negative reinforcement)

Tact:	N.4 N.8	→ K.2	→ no N.4 N.8
Echoic:	N.4 N.8	→ K.4	→ no N.4 N.8
Intraverbal:	N.4	→ K.5	→ no N.4
Informative Autoclitic:	N. talk	→ K.8	→ no N. talk

Katie, who is the most vocal member in the Tavistock session, is for the most part, self-stimulated and self-reinforced. The only real control that any other group member exerts on Katie's verbal contingencies comes from Nancie- the withdrawal of Nancie's verbal behavior (especially her echoic and informative autoclitic behavior) negatively reinforcing four of Katie's verbal operants.

CAROL
No Reinforcement Contingencies Operate

Carol emits very few verbal operants, none of which show an increase in rate over the one hour of group interaction.

** Indicates that operant is reinforced either by N.5 K.5 or by N.7 K.4 but that both are not present together.

*** Any combination of verbal acts emitted by Katie constitute the stimulus situations.

ELLEN-ANN
(positive reinforcement)

Affective Autoclitic:	N.4	E.7	N.7 K.7

(negative reinforcement)

Echoic:	N.7	E.4	no N.7

Ellen-Ann is another low vocal interactor. Only two of her verbal operants show any increase in their rates of emission - her affective autoclitics are positively reinforced by the same behavior on the part of Nancie and Katie and her echoic behavior is negatively reinforced by the withdrawal of Nancie's affective autoclitics.

LILLY
(positive reinforcement)

Mand:	K.6 K.4 K.8	Li.1	K.8 K.5
Tact:	Li.N.K. interaction	Li.2	N.4 Li.4 K.4
Extended Tact:	Li. talk	Li.3	Li. talk
Echoic:	Li.5 Li.6 Li.7	Li.4	K.4 Li. talk
Intraverbal:	Li.6 Li.8	Li.5	Li.4
Control Autoclitic:	Li.8 Li.7	Li.6	Li.8
Affective Autoclitic:	K.7 K.8	Li.7	K.7 K.8 N.7 N.8
Informative Autoclitic:	Li.7	Li.8	K.8 Li.talk

(negative reinforcement)

Extended Tact:	K.6 K.3 K.8	Li.3	no K.6 K.3 K.8
Intraverbal:	N.7	Li.5	no N.7

Lilly is a relative high vocal interactor in the group session. Her verbal behavior is about equally controlled by self-stimulation and by verbal stimulation from Nancie and Katie.

NANCIE
(positive reinforcement)

Mand:	K.7 N.7 N.2	N.1	K.4 K.7 N.7
Tact:	N.7 N.4	N.2	N.8
Extended Tact:	N. talk R.7 R.4	N.3	N.1 N.4 N.7 R.7
Echoic:	K.7 K.5	N.4	N.4 N.4
Intraverbal:	K.5 K.8 N.7 N.8	N.5	N.7 K.4
Control Autoclitic:	K.8 K.5 N.5	N.6	N.6 N.8 K.8
Affective Autoclitic:	N.8	N.7	K.8 N.8 N.7
Informative Autoclitic:	N.1 N.5	N.8	N.6 N.5 N.7

(negative reinforcement)

Tact:	R.4 R.7	N.2	no R.4 R.7
Informative Autoclitic:	K.5 K.8 Li.7	N.8	No K.5 K.8 Li.7

Nancie's verbal operants are in most part, functionally controlled by her own verbal behavior, and the verbal behavior of Katie. Lilly and R on are represented in Nancie's contingencies to a lesser extent.

TRAINER
(positive reinforcement)

Tact:	T.5	T.2	N.8 T.5
Echoic:	T. talk	T.4	T. talk
Intraverbal:	T.2	T.5	T.2
Informative Autoclitic:	T. talk	T:8	T. talk

(negative reinforcement)

Tact:	Li.7	T.2	no Li.7
Echoic:	Li.7	T.4	no Li.7
Intraverbal:	Li.7	T.5	no Li.7
Informative Autoclitic:	Li.7	T.8	no Li.7

The Trainer's verbal contingencies show a very orderly pattern with all his increasing operants being both positively and negatively reinforced. Positive reinforcement comes from the Trainer's own verbal behavior; negative reinforcement comes from the withdrawal of Lilly's affective autoclitic behavior.

TABLE VIII

CONTINGENCIES OF REINFORCEMENT OPERATIVE IN GESTALT SESSION 1

SYMBOLS - Letters indicate the group members:

S = Sylvia	Le = Lela
J = Jane	M = Mary
F = Fritz	L = Lil
Jo = Jo	T = Trainer

Numbers indicate verbal operants and arrows indicate causal connections (see Table 3-6).

SYLVIA
(positive reinforcement)

Extended Tact:	L.4 L.5 S.4 S.5 → S.3 → L.4
Echoic:	Le.4 → S.4 → L.4 Le.4
Intraverbal:	Le.4 S.4 L.7 → S.5 → Le.5
Affective Autoclitic:	S.5 S.4 → S.7 → S.5 Le.5
Informative Autoclitic:	L.5 S.5 L.4 → S.8 → L.4 Le.4

(negative reinforcement)

Echoic: F.6 F.8 → S.4 → no F.6 F.8

Sylvia's verbal operants are consistently stimulated and positively reinforced by echoic and intraverbal behavior emitted by Lela, Lil or Sylvia herself. Her echoic operant is further strengthened by a contingency of negative reinforcement involving the withdrawal of Fritz's autoclitic behavior.

JANE
(positive reinforcement)

Affective Autoclitic: L.7 F.3 → J.7 → { M.7 / Le.7 } (L.5)

Jane is a very low vocal interactor in the Gestalt session. Nonetheless, she emits a large number of affective autoclitics (predominantly non-vocal) which are reinforced either by similar behaviors from Mary and Lela, or by intraverbal behavior from Lil..

FRITZ

(positive reinforcement)

Mand:	F. talk	F.1	F.6
Tact:	F. talk	F.2	F. talk
Extended Tact:	F.6 F.8 L.7	F.3	F. talk L.8
Echoic:	F.6 F.8 M.4	F.4	F.8 L.8
Intraverbal:	F. talk	F.5	F. talk L.8
Control Autoclitic:	F.8	F.6	F. talk
Affective Autoclitic:	F.6 F.8 M.7	F.7	F. talk
Informative Autoclitic:	F.6	F.8	F. talk

(negative reinforcement)

Control Autoclitic:	Le.7 L.7	F.6	no Le.7 L.7
Informative Autoclitic:	M.7 Le.7	F.8	no M.7 Le.7

Fritz, who is the most vocal member of the Gestalt group, is predominately self-stimulated and self-reinforced. Verbal operants by Lil and Mary are sometimes present in discriminative simulus combinations and Lil's informative autoclitic positively reinforces three of Fritz's operants. In addition to positive self-reinforcement, Fritz's control and informative autoclitics are negatively reinforced by withdrawal of the affective autoclitic behavior of Lil, Mary and Lela.

JO

(positive reinforcement)

Affective Autoclitic:	M.1	Jo. 7	[illegible]

(negative reinforcement)

Affective Autoclitic:	F.6 F.7	Jo. 7	F.6 F.8

Only one of Jo's verbal operants shows any increase in its rate of emission during the one hour of Gestalt interaction. Her affective autoclitic is stimulated by Mary's mand and positively reinforced by Fritz's informative autoclitic. The same behavior receives negative reinforcement through the withdrawal of Fritz's control and affective autoclitics.

LELA
(positive reinforcement)

Mand:	L.7 Le.8	→ Le.1	→ Le.4 S.4 S.8
Tact:	L.5 Le.1	→ Le.2	→ Le.8
Extended Tact:	L.7	→ Le.3	→ L.1 M.1
Echoic:	Le.5	→ Le.4	→ Le.7 L.7
Intraverbal:	Le.4 Le.7	→ Le.5	→ Le.7 M.7
Control Autoclitic:	Le.8	→ Le.6	→ F.2 T.2 Le.6
Affective Autoclitic:	Le.2 Le.3 Le.5	→ Le.7	→ M.4 M.7 Le.7
Informative Autoclitic:	Le.4 Le.5 Le.7	→ Le.8	→ Le. talk

(negative reinforcement)

Control Autoclitic:	L.7	→ Le.6	→ no L.7
Informative Autoclitic:	L.4 L.7	→ Le.8	→ no L.4 L.7

While Lela's verbal operants are largely self-stimulated, they are positively reinforced by a variety of verbal operants emitted by six different group members. The removal of Lil's affective autoclitics and echoics negatively reinforces Lela's control and informative autoclitics.

MARY
(positive reinforcement)

Mand:	M.4 Le.7	→ M.1	→ M.7 L.7
Tact:	M.7 L.7 Le.7	→ M.2	→ Le.5
Echoic:	M.7 M.8 F.6 F.8	→ M.4	→ F.5
Intraverbal:	M. talk	→ M.5	→ M. talk
Control Autoclitic:	Le.7 Le.5	→ M.6	→ M.7 Le.7
Affective Autoclitic:	M. talk	→ M.7	→ M. talk
Informative Autoclitic:	M. talk	→ M.8	→ M. talk

(negative reinforcement)

Tact:	F. talk	→ M.2	→ no F. talk
Intraverbal:	F.6 F.8 Le.7	→ M.5	→ no F.6 F.8 Le.7
Affective Autoclitic:	Le.3 Le.2	→ M.7	→ no Le.3 Le.2
Informative Autoclitic:	F. talk	→ M.8	→ no F. talk

Mary, a relatively high interactor in the Gestalt group is largely self-stimulated and self-reinforced. While the verbal operants of Lela and Fritz provide some positive reinforcement for Mary's verbal operants, they play a more prominent role in the contingencies of negative reinforcement - their removal reinforcing four of Mary's operants.

LIL
(positive reinforcement)

Mand:	L.7 L.4 M.7	→ L.1 →	M.7
Tact:	L. talk	→ L.2 →	L.7 M.7
Extended Tact:	L.6	→ L.3 →	L.8 Le.5
Echoic:	L.2 L.3 L.6 T.2	→ L.4 →	L.1 Le.4
Intraverbal:	L. talk M.1 M.5	→ L.5 →	L. talk
Control Autoclitic:	L.3 M.7	→ L.6 →	L.5 L.8
Affective Autoclitic:	L. talk M.1 M.2	→ L.7 →	L.8 L.7
Informative Autoclitic:	L. talk T.5	→ L.8 →	L. talk

(negative reinforcement)

Extended Tact:	F.8	→ L.3 →	no F.8
Control Autoclitic:	F.6 F.7 F.8	→ L.6 →	no F.6 F.7 F.8

Lil's positive reinforcement contingencies are, for the most part, self-stimulated and self-reinforced. The removal of Fritz's autoclitic behavior provides additional negative reinforcement for Lil's extended tacts and control autoclitics.

TRAINER
(positive reinforcement)

Mand:	T. talk	→ T.1 →	T.2 L.2 L.6
Tact:	T.5 T.7 L.7	→ T.2 →	T.8
Echoic:	T.2 T.7 L.4 L.5	→ T.4 →	L.8
Intraverbal:	T.7 L.6	→ T.5 →	T.1
Control Autoclitic:	T.1	→ T.6 →	T.2 L.2
Affective Autoclitic:	T.2 T.5 L.7	→ T.7 →	L.5
Informative Autoclitic:	T.4 T.5 T.7	→ T.8 →	T.2

(negative reinforcement)

Mand:	F.5 F.6 F.8	→ T.1 →	no F.5 F.6 F.8
Intraverbal:	F. talk	→ T.5 →	no F. talk
Control Autoclitic:	F.6 F.8	→ T.6 →	no F.6 F.8
Informative Autoclitic:	F. talk	→ T.8 →	no F. talk

The Trainer in the Gestalt group is positively reinforced by his own verbal operants and by the verbal operants of Lil. Negative reinforcement for the Trainer's verbal behavior is supplied by the removal of Fritz's verbal operants.

situation.

While it would be tedious to analyze in detail all the information included in Tables VII and VIII, a more extensive look at two individuals from each of the groups will serve to give the schematic representations more meaning in terms of the actual non-quantified group interaction itself. Since the reader is already somewhat familiar with Katie and Carol of the Tavistock group, and Fritz and Jo of the Gestalt group, there is no reason why these individuals should not be selected for this purpose. This selection is further desirable in that the extremes of high and low verbal interaction are thus represented.

In the Tavistock group, all the verbal operants emitted by Katie show marked increases in rate of emission at various times. The positive and negative reinforcement contingencies which account for these increases are shown in Table VII. Considering the contingencies of positive reinforcement first, it is obvious that Katie's communicative behavior is largely self-stimulated and self-reinforced since acts by Katie occur in all three terms of each of the eight contingencies listed. The behavior of other group members doesn't exert a great deal of control over Katie's behavior. However, it does play a functional role in two categories of the verbal operant contingencies. Katie's manding behavior is reinforced by both her own affective autoclitic, and a combination of control autoclitics emitted by herself and Nancie. From the written transcript

of the session it can be seen that when the mand consists of an admonishment, as in the example "Let's talk about it", the immediately succeeding activity is generally a form of affective autoclitic behavior emitted by Katie. A short laugh or friendly overture to another group member serves to mitigate the severity of the command and sets the stage for the comments of others. When the mand emitted by Katie is a question which requires an immediate reply, it is reinforced by control autoclitics from Katie herself or from Nancie. In the example "Why can't you do it with the people you work with?" Nancie begins her reply with the control autoclitic "Well ...". In similar situations when no reply is immediately forthcoming, Katie emits a control autoclitic which allows her to continue talking and in this way further explain or clarify her question. The other instance where another group member exerts control over Katie's verbal behavior is the emission of informative autoclitics by Lilly. These serve to reinforce Katie's extended tacting behavior. When an extended tact such as "My mother-in-law" is emitted after verbal acts by Lilly and Katie it is reinforced by Lilly's response which begins with the informative autoclitic "I see that ...". On other occasions Katie herself reinforces similar statements with the same kind of informative autoclitic.

The contingencies of negative reinforcement which control Katie's verbal output (see Table VII - Katie , negative reinforcement)

are basically all of a single type - i.e. the emission of verbal acts by Katie tends to diminish the verbal output of Nancie. In other words, the withdrawal of aversive stimulation characteristic of negative reinforcement occurs in this instance when the verbal behavior of Nancie decreases as a consequence of Katie's, verbal actions. This phenomenon occurs most often in connection with Nancie's echoic and informative autoclitic behavior, both of which, if given the opportunity, act as positive stimuli for further communicative behavior on the part of Nancie. By cutting through this sequence with her own behavior, Katie escapes Nancie's echoics and informative autoclitics, and avoids the ensuing barrage of verbal output by Nancie.

Turning our attention to Carol it is obvious from Table VII that since none of the operant categories used by Carol show any significant changes in their rates of emission throughout the first session of the treatment, no contingencies of reinforcement are found; nor indeed would any be expected. Carol's role in the group is passive and withdrawn. She emits almost no verbal behavior of her own and does not exert any significant influence or control over the verbal behaviors of other group members. Not only do the contingencies necessary to shape specific verbal responses by Carol appear not to be present in the group situation, but contingencies necessary to produce any verbal behavior by her at all are conspicuously absent.

In the Gestalt group, the extremes of high and low verbal

interaction are represented by Fritz and Jo respectively. An examination of the contingencies of reinforcement which control the verbal interaction of these two individuals (see Table VIII) reveals striking similarities with the contingencies already discussed which operated in the Tavistock group for Katie and Carol. Like Katie, Fritz is largely self-stimulating and self-reinforcing. Acts emitted by Fritz occur in all three terms of the positive reinforcement contingencies listed in Table VII. The only other group members who play an active role in any of Fritz's positive reinforcement contingencies are Lil and Mary. The emission of informative autoclitics by Lil (eg. "I see ...", "I understand...", "I know ...", etc.) reinforces Fritz's extended tacting, echoic, and intraverbal behavior; while Lil's affective autoclitic, Mary's echoic, and Mary's affective autoclitic behavior respectively act as stimuli for extended tacting, echoic and affective autoclitic behavior on the part of Fritz. Only two contingencies of negative reinforcement operate to control Fritz's verbal output in the first session of the Gestalt treatment. The withdrawal of affective autoclitic acts emitted by Lela and Lil negatively reinforces activity by Fritz in the control autoclitic category. Fritz's informative autoclitic behavior is similarly reinforced by the withdrawal of the affective autoclitics of Lela and Mary. While it may appear somewhat peculiar that affective autoclitics by either Mary or Lil act as discriminative stimuli in two of Fritz's positive reinforcement contingencies, and as aversive

stimuli in the contingencies of negative reinforcement, the difficulty is merely a reflection of the breadth of the affective autoclitic category. As mentioned in Chapter 2, the eight-category system of interaction analysis being used for the present purpose does not differentiate between positive affective autoclitics and those autoclitics which carry a negative affective loading. With this in mind, and with the aid of written transcripts of the first Gestalt session it becomes obvious that those affective autoclitics which serve as discriminative stimuli are positive autoclitics such as the spoken forms "Yes", "Right" etc. or the non-spoken behaviors of 'nodding one's head in agreement' or of 'paying strictest attention'; while the affective autoclitics which qualify as aversive stimuli are negative autoclitics. Examples of this latter group include interruptions, clickings of cigarette lighters, inattentive postures, and strongly registered disagreements, all of which have a disruptive effect on ongoing verbal behavior.

As the Gestalt group member who emitted the fewest verbal acts during the first therapeutic session, Jo is much like Carol in the Tavistock group, in that almost none of her verbal operants show any significant changes in their rates of emission. Consequently only two contingencies of reinforcement (one positive and one negative) appear in Table VIII. While both contingencies control increases in the rate of emission of Jo's affective autoclitic, they accomplish this end in different ways. In the positive reinforcement

contingency, a mand by Mary acts as a discriminative stimulus for the affective autoclitic which is then reinforced by an informative autoclitic from Fritz . A sequence from the transcript of the first Gestalt group which illustrates this pattern begins with Mary advising Fritz with the statement "Just go ahead and do it". Jo nods her head in agreement with this sentiment (affective autoclitic) and Fritz responds with the remark "I see" (informative autoclitics).

The contingency of negative reinforcement which increases the rate of emission of Jo's affective autoclitic does so through the withdrawal of aversive stimuli consisting of control and affective autoclitics emitted by Fritz. The written transcript of the session is filled with examples of Jo cutting Fritz off just as he is attempting to gain the floor by means of statements such as "Well", "No", "Now", etc. Once cut off in this way, Fritz doesn't make another such attempt immediately.

Having concentrated on the verbal behaviors and contingencies of reinforcement of specific group members from each of the first treatment sessions in order to familiarize the reader with the kinds of meanings attached to the schematic representations listed in Tables VII and VIII, it would now seem desirable to take a more general view of the information contained in these tables. Similarities in the contingencies of reinforcement operating on the verbal behavior of the high interactors in both groups have already been noted. A more intensive survey of the various common characteristics and differences

in the contingencies of reinforcement operating across group members and between treatment groups will now be attempted. In this connection, four main points suggest themselves from TablesVII andVIII.

Firstly, as has already been hinted, the high interactors in both groups tend to be largely self-reinforcing and self-stimulating. They respond to their own verbal cues regardless of whatever else is taking place in the group. As a result the greater part of their communicative behavior is coded in the interaction categories four through eight. In all of these categories the stimulus which precedes the verbal operant is itself verbal. Categories one to three do not conform to this formula. The stimulus for a mand is a state of deprivation or aversive stimulation; the stimulus for a tact, or extended tact, is found in the physical properties of a situation or event. The verbal behavior of the high interactors in both groups - Katie, Nancie and Lilly in the Tavistock group; and Fritz, Lela, Lil and Mary in the Gestalt group - is centered in the last five interaction categories (see Appendix 2).

The effect of this abstract, self-produced verbal behavior on the group is tremendous. The lack of any concrete objective reference in verbally stimulated behavior makes the conversation of the high interactors largely unintelligible to the other group members. Extreme rifts develop between the talkers and the non-talkers as the sessions proceed. Thus the self-reinforcing behavior of the high interactors is

itself reinforced because of the opportunity it provides to control the "floor-time" in the groups. A second advantage is obvious in that by avoiding any reference to the objective reality of the group situation, a much safer fantasy world is constructed which is immune to the troublesome "needling" of the real world.

Abstract verbal behavior thus acts as a powerful defence mechanism which protects and shelters the behaving organism from the reality of his or her own behavior. The spoken word becomes as real, or even more real than the physical situation. Speech and verbal behavior have a reality of their own which operates in much the same way as non-verbal reality in terms of the control which it exerts on the individual group member. A crude behavioristic approach which concentrates solely upon physical objects which can be touched and physically moved about often ignores these vital facts about human behavior. Of course, the implication of these observations is obvious for psychotherapy. An individual who is said to be 'separated-from-reality' is probably very much in touch with his own verbal reality. The fact that this verbal reality has been shown to operate according to the same fundamental principles which Skinner and others have discovered while considering other forms of behavior opens new horizons to the clinical psychologist and behavioral technologist concerned with remedial programs for the maladjusted.

A second generalization from Tables VII and VIII, closely associated with the first, is that the high interactors not only control

their own verbal behavior, they also control the behavior of the less-interactive members. In the Tavistock group, operants by Nancie, Katie and Lilly are consistently found as discriminative, aversive and reinforcing stimuli in the contingencies of such individuals as Ron and Ellen-Ann. A similar relationship exists in the Gestalt group between Fritz, Lil, Lela and Mary, and Jo and Sylvia. Consequently the low interactors are shaped up by the high interactors to accept the behavioral format generated by the high interactors' verbal behavior. There seems to be a positive correlation between quantity of verbal behavior and 'reinforcement potential' (i.e. the potential of one individual to shape the behavior of another). This makes sense because of the natural tendency to orient and attend to the "spokesman" of a group.

The third general observation from Tables VII, VIII and Appendix 2 relates back to the hypothesis previously mentioned. Taking account of the large percentage of the overall interaction in both groups which is self-stimulated and self-reinforced, it is still true that the Gestalt group makes much greater use of positive reinforcement contingencies than does the Tavistock group. Conversely, negative reinforcement contingencies account for more of the Tavistock interaction than the Gestalt interaction. As mentioned previously the depressive mood and negative affective tone of the Tavistock group is in contrast to the Gestalt group. This probably points to a higher level of aversive stimulation present in the former situation. The different roles of the

trainers can be viewed as a causal factor behind this phenomenon. The greater interest in, and willingness to pursue and generate fantasy material, which characterizes the Gestalt trainer's interaction, promotes a more positive orientation to the abstract verbal material expressed by the high interactors in this group. In the Tavistock group this type of comfortable reinforcement is simply not forthcoming.

A final fact which is obvious from the tables of reinforcement contingencies concerns the nature of reinforcement. The present analysis does much to point out the inadequacies of over-simplistic behavioristic studies of human behavior. The treatment of quantified verbal data in a traditional learning theory framework has first of all to accept the fact that a unit of verbal behavior has a physical dimension as though it were a physical object. As long as reinforcement is thought of as something which drops into a dish following the clicking of a magazine, no progress can be made in this direction. The second point to be made in this connection is that in the initial stages of a behavioral analysis, the experimenter must refrain from imposing his subjective judgements and prejudices. It must be recognized that what is reinforcing for the experimenter need not necessarily be reinforcing for the subject being studied. From Tables VII and VIII it is true that certain verbal acts show consistent reinforcement potential across group members. Echoic behavior and positive affective autoclitics are reinforcing properties for specific

group members. One such example occurs in the Gestalt group when the behaviors of Lela, Mary and Lil are considered. In the contingencies listed for these three women (see TableVIII) it is readily seen that as a group they tend to reinforce the verbal behavior of each other with affective autoclitics. Reference to the video and audio-tapes of the first Gestalt session reveal that these affective autoclitics are not positive in nature at all, as might be expected, but that they are negatively loaded. The fact that this kind of disruptive behavior reinforces these three women would probably have gone unnoticed during the course of a subjective impressionistic account of the group dynamic.

By way of summarizing the present chapter, the following points have relevance to the overall problem to which this thesis is dedicated - i.e. the experimental evaluation of Skinner's 1957 hypotheses concerning verbal behavior and the testing of learning theory principles in a natural human situation in general.

1. The verbal operants proposed by Skinner in 1957, with slight modification for the purposes of the present experiment, satisfactorily include all the verbal behavior, as defined by Skinner, of human subjects behaving in a relatively non-structured social environment.
2. The basic principles of reinforcement theory coupled with the concept of 'contingencies of

reinforcement' do operate in this area, and do account for any learning, operationally defined, which takes place.

3. Human behavior of the highest form (i.e. speech) seems to operate according to the scientific law of causality.

While these findings are general rather than specific in nature, they open the doors to further, more precise investigation of human behavior by sophisticated behavioral techniques.

As an initial stage in such a project, the analysis reported on these pages has certain shortcomings. While the operation of positive and negative reinforcement has been established, the operation of punishment and extinction have not been discussed in any detail. To understand the learning process in it s entirety these must be taken into consideration. Decreases as well as increases in the rates of emission of particular operant categories must be analyzed to throw light on these issues.

An improvement must be made in the system of interaction analysis itself. The eight-category system used in the analysis of the first Tavistock and Gestalt session is somewhat biased in favor of vocal behavior. Non-vocal gestures, and movements - which are "verbal" in Skinner's sense - are not coded as often as vocal verbal behavior. An expansion of the category system as outlined in Chapter 4 would help to balance this situation. By the use of this

second system of analysis and the selection of still finer units of responding, more light may be thrown on the behavior of the non-vocal members of a group. The final area in which improvement seems necessary involves the elucidation of each individual increase or decrease in the emission rate of a specific operant. The present chapter has reported general contingencies which influence the operant in question over a full session. However, from time to time, other stimuli and reinforcements of short-duration may enter into this overall picture and produce more specific effects. The analysis to be reported in the following chapter tries to incorporate these improvements in a detailed analysis of verbal behavior in a fifteen minute segment of a learning group made up of undergraduate students enrolled in their first year in the Faculty of Education at the University of Alberta.

CHAPTER 4

THE OPERATION OF PRINCIPLES OF REINFORCEMENT IN A SMALL LEARNING GROUP

In an effort to improve and sharpen the analysis, the eight-category system of interaction analysis developed from Skinner's 1957 verbal operants was expanded to include two new categories (see Table 1). Categories 6 and 7 in the previous system were sub-divided to produce these new operant areas. Previously, to this point, no distinction has been made between dominant and submissive control autoclitics, or between positive and negative affective autoclitics. The bipolar division adds valuable information to the analysis, and does not drastically alter Skinner's basic formulations, indeed these distinctions are in the spirit of his analysis. Further, the inclusion of submissive control autoclitics as a separate category affords the opportunity to code the attentive, listening behavior of low vocal interactors. The coding of these behaviors, which had gone unremarked in previous analyses, adds an important dimension to an analysis of contingencies of reinforcement. For one thing, it helps to counter the natural tendency of the human observer (since indeed he too is a member of a verbal community) to focus his attention upon vocal behavior.

Further to ensure that the new coding system would not show a 'vocal' bias, the coding technique itself was altered. Instead of coding the salient behavior of particular members in the group as it happened,

it was decided to code the behavior of each individual group member separately. The behavior of each participant was therefore coded every three seconds so that no one member was favoured in the sense of having more acts during the experimental period than did any other member (see Chapter 2 for the exact procedures followed).

Because of the great amount of time necessary to make this kind of analysis, the data reported in this chapter are taken from only fifteen minutes of a small learning group. The group consisted of eight undergraduates enrolled in the Faculty of Education at the University of Alberta, and an instructor. The stated task was for the group to learn about 'empathy' and how to acquire and make use of this facility. The instruction was given in a pupil-centered seminar, the instructor acting as a resource person for both information and motivation.

In addition to ensuring "fair" treatment for the low vocal interactors, the present analysis aims to provide a functional account of the learning process as manifested in changes in the emission rates of the particular verbal operants. In place of elucidating a general contingency of reinforcement to account for such changes, attention will be directed to the more subtle differences in reinforcement contingencies as they change during the experimental period. In addition, the processes of extinction and punishment which operate will be elucidated alongside the reinforcement contingencies. The latter involves scrutiny not only of the periods of operant increases,

but also the periods of operant constancy and decrease.

Before pursuing these refinements, an overview of the general reinforcement contingencies operating in the learning group will be undertaken. This section, outside of the refinements in the coding system itself and in the coding technique, is comparable to the analyses discussed in Chapter 3, summarized in Tables VI and VII. The value of this presentation is two-fold: it enables the reader to compare the learning group with the psychotherapeutic groups, and it sets the stage for a better understanding of the more detailed account to follow. Table IX summarizes the general contingencies of positive and negative reinforcement which operate during the fifteen minutes of the learning group interaction. (Note: only those operants which show an increase in rate of emission are included.)

No attempt will be made to look at Table IX from the standpoint of individual contingencies. The fact that this can be done has already been illustrated in Chapter 3. The emphasis here will be on general characteristics of the reinforcement principles operative in the learning group as a whole. While not as many verbal operants in the learning group fluctuate in emission rate, as in the psychotherapy groups, this is primarily a consequence of the shorter time interval coded.

As was anticipated, the inclusion of the two new categories, and the use of the more systematic coding technique, allow for a much clearer interpretation of the interaction than was previously the case.

TABLE IX

CONTINGENCIES OF REINFORCEMENT
OPERATIVE IN LEARNING GROUPS

Key for People

D = Debbi	Da = Dale
G = Garth	Bo = Bob
B = Bernie	T = Tommy
H = Henry	I = Instructor
A = Audrie	Gr = Group as a whole

Stimuli	Response (Operant)	Reinforcement

DEBBI
(positive reinforcement)

Negative Affective Autoclitic — Da.9 D.7 ⟶ D.7 ⟶ Bo.9

Submissive Control Autoclitic — D.9 G.9 ⟶ D.9 ⟶ D.7

(negative reinforcement)

NONE

Debbi appears to be mainly self-stimulating and reinforcing. Submissive control autoclitics are positive stimuli for her.

GARTH
(positive reinforcement)

Submissive Control Autoclitic — Gr.9 ⟶ G.9 ⟶ Gr.9

(negative reinforcement)

NONE

Garth doesn't vocalize extensively and his submissive autoclitic behavior is under the control of similar behavior by other group members.

BERNIE
(positive reinforcement)

Negative Affective Autoclitic B.7 ⟶ B.7 ⟶ B.9 D.1 T.9

Submissive Control Autoclitic D.7 B.9 T.9 ⟶ B.9 ⟶ Bo.7

(negative reinforcement)

NONE

Bernie is largely self-reinforcing and self-stimulating. However Debbi's manding and Bob's negative affective autoclitic behavior are important reinforcing stimuli for her.

HENRY
(positive reinforcement)

Submissive Control Autoclitic Gr.9 ⟶ H.9 ⟶ Da.9

(negative reinforcement)

NONE

Henry's submissive autoclitic behavior is stimulated by similar group behavior and reinforced by submissive autoclitic behavior by Dale.

AUDRIE
(positive reinforcement)

Submissive Control Autoclitic Gr.9 ⟶ A.9 ⟶ H.9 G.9

(negative reinforcement)

NONE

As another non-vocal member, Audrie's submissive autoclitic behavior is stimulated by group submissive autoclitics and reinforced by the same behavior by two of the male group members.

DALE
(positive reinforcement)

Submissive Control Autoclitic: Bo.9 → Da.9 → H.9 A.9 Da.9

(negative reinforcement)

Submissive Control Autoclitic: D.7 → Da.9 → no D.7

Dale's submissive behavior is generally reinforced in two ways - i.e., by similar behavior on the part of Henry, Audrie and Dale, and by the withdrawal of Debbi's negative affective autoclitic.

BOB
(positive reinforcement)

Negative Affective Autoclitic: Bo.7 T.9 → Bo.7 → D.7 Bo.9

Submissive Control Autoclitic: Da.9 Bo.9 T.9 → Bo.9 → H.9 T.7

(negative reinforcement)

Negative Affective Autoclitic: I.1 → Bo.7 → no I.1

Bob seems to be positively reinforced by negative affective behavior more so than any other group member. His own negative affective autoclitic behavior is itself reinforced by the withdrawal of the manding behavior of the instructor.

TOMMY
(positive reinforcement)

Echoic: I.9 T.4 → T.4 → (H.9) (I.1)

Negative Affective Autoclitic: Gr.9 → T.7 → D.7 Bo.7 T.7

Submissive Control Autoclitic: Gr.9 I.5 I.1 → T.9 → (I.2) (I.1) (I.9)

(negative reinforcement)

Echoic: Bo.7 → T.4 → no Bo.7

Negative Affective Autoclitic: I. talk → T.7 → no I talk

Tommy exhibits a more complex array of contingencies which are dealt with in detail in the text of this chapter.

INSTRUCTOR
(positive reinforcement)

Mand	T.9 I.1 Bo.7 →	I.1 →	(Bo.9) (I.9)
Tact	I.2 G.9 →	I.2 →	(A.9) (B.9 I.1)
Intraverbal	D.9 Bo.9 I.5 →	I.5 →	(B.9) (I.4)
Submissive Control	H.9 Da.9 I.9 →	I.9 →	(Da.9 I.9) (T.4)
Autoclitic			

(negative reinforcement)

Mand	T.7 →	I.1 →	no T.7
Submissive Control	Bo.7 →	I.9 →	no Bo.7
Autoclitic			

The instructor is also dealt with in detail in the text of this chapter.

From a quick survey of the reinforcing stimuli shown in Table IX it is obvious that the large proportion of such behaviors occur in categories 7 and 9. Generally speaking, submissive control autoclitic behavior, as well as the withdrawal of negative affective autoclitic behavior, are reinforcing for all the group members. Simply stated, in the broadest of contingencies, speaking by an individual is reinforced by listening on the part of others, as well as the cessation of competitive behavior by others in the group. While the point seems rather obvious it is of great interest that quantitative analysis validates such 'common sense' impressions. The implications of this "obvious" association between speaking and listening behaviors are quite profound.

A second general observation from Table IX concerns the nature of the stimulus combinations which precede the emission of particular verbal operants. In all such cases, a verbal operant of the same class as the response operant occurs with amazing regularity in the stimulus combination. In other words, if the instructor emits a mand, this mand is preceded by another instructor mand. This finding is common to all the individual contingencies portrayed in Table IX and is far from being obvious and "common sense". Bales (1950), using his system of interaction analysis, arrived at a similar observation. He noted that the act most likely to follow another act was one in the same category as the preceding act.

However, Bales did not fully appreciate the functional control that an act belonging to a specified class of behaviors exercises on other acts of the same class. Indeed such an insight is impossible lacking a functional analysis of coded behavior. While descriptive structural accounts of behavior are valuable in providing an overall picture of interaction phenomena, and for generating particular hypotheses, they do not facilitate understandings of causal relations, which imply the possibility of predicting and controlling the actions observed.

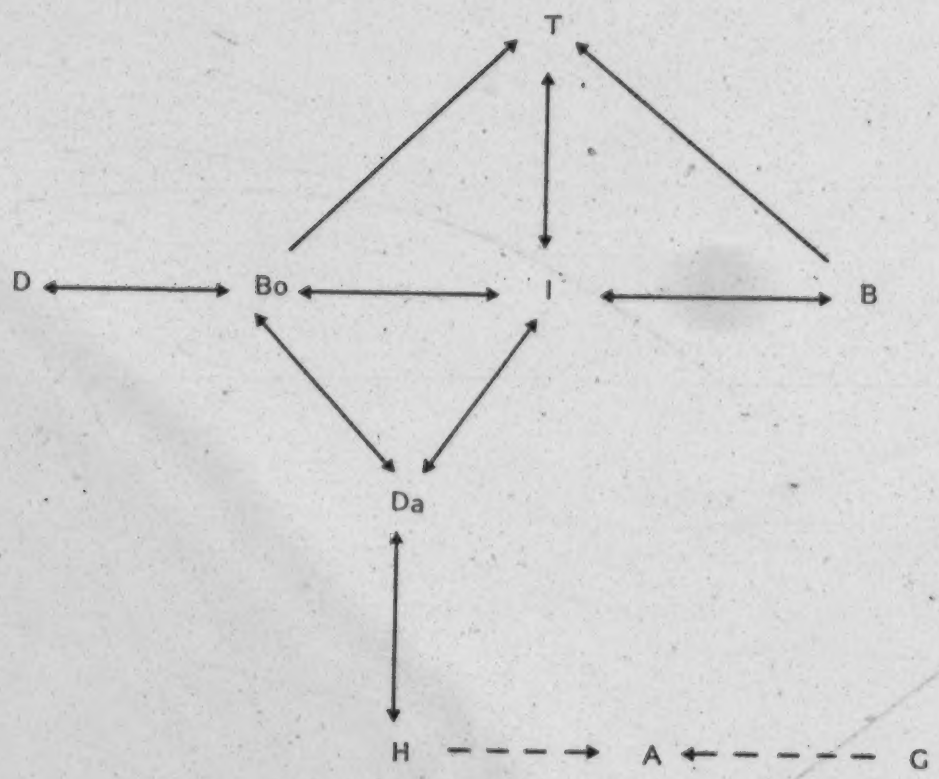
Amongst others who have observed the repetitive nature of human behavior, using discrete units of response, are the many psychologists interested in imitation, modeling, and vicarious learning. The work of Albert Bandura epitomizes efforts in these directions.

Table IX is schematically summarized in the sociogram shown in Figure 2. This figure shows at a glance the reinforcing and stimulating relationships which characterize the learning group under consideration. Figure 2 will be utilized in connection with Figures 3 and 4 to demonstrate the operation of extinction, and punishment, along with the contingencies of positive and negative reinforcement. A dynamic mapping of these processes which include, and account for, subtle changes in reinforcement contingencies over the course of the experimental period is the main aim of the present chapter.

In addition to extinction and punishment it is necessary to

FIGURE 2

SOCIOGRAM OF
INTERACTION IN LEARNING GROUPS
IN TERMS OF REINFORCEMENT AND POSITIVE STIMULATION



Note: Solid arrows (⟶) indicate that reinforcement and positive stimulation follow the direction of the arrow.

Broken arrows (- - →) indicate that either reinforcement or positive stimulation follow the direction of the arrow, but not both.

consider a process which we shall call 'stimulus deprivation'. Although not a new term, its use in the present context is unique and specific. While the operation of reinforcement, extinction or punishment is sufficient to explain the behaviors of animal subjects in rigidly controlled experimental environments, these constructs are not entirely adequate to explain the behavior of human subjects in a more flexible setting. In the experiment with learning and psychotherapy groups it is not possible to ensure environmental constancy. Each time a subject speaks, his action alters the social environment for his fellow group members, indeed for himself as well. Given this situation, it may not always happen that a regular decrease in the emission rate of a particular operant is the result of extinction (withdrawal of reinforcement after conditioning), or that an irregular decrease results from punishment (presentation of aversive stimulation or withdrawal of pleasant stimulation). A decrease may occur simply because the discriminative stimulus which exerts control over its emission ceases to be present. The withdrawal of a discriminative stimulus is termed stimulus deprivation.

Turning then to the task at hand, the behaviors of Tommy (T) and the instructor (I) (see Table IX) will be used to illustrate the dynamic mapping interpretation promised previously.

From the analysis summarized in Figure 2, it is clear that the instructor is the key figure in the group, both in terms of the discriminative stimuli and reinforcements which he provides, and in

terms of the discriminative stimuli and reinforcements he receives from other group members. This giving and receiving of stimuli and reinforcements operates primarily between the instructor and Bob, Bernie and Tommy. Other two-way interactions, involving giving and receiving of stimuli and reinforcements, occur between Bob and Debbi, Bob and Dale, and Dale and Henry. Debbi, Henry, Audrie and Garth are seen (from Figure 2) to be peripheral members of the group, in terms of the stimuli and reinforcements which they provide or obtain, since they have no direct interactive relations with the Instructor. Dale provides input to the instructor but does not receive anything in return. The same is true of Bob and Bernie in their interaction with Tommy. Tommy's only input is to the Instructor. Tommy seems to be the instructor's 'right-hand-man'. Even Bob and Bernie, who have direct access to the instructor themselves, provide reinforcement and stimulation for Tommy. The net increase which this produces in Tommy's verbal interaction strengthens his "hold" on the instructor. The unique relationship between Tommy and the instructor, and the ways in which it is facilitated by the other members should become clearer as Figures 3 and 4 are considered in detail.

Figure 3-a, the cumulative graph of Tommy's echoic behavior shows two increases in the rate of emission of this behavior over the experimental time period. The first increase is the result of the positive reinforcement contingency. In this case the instructor's submissive control autoclitic and Tommy's echoic behavior act as

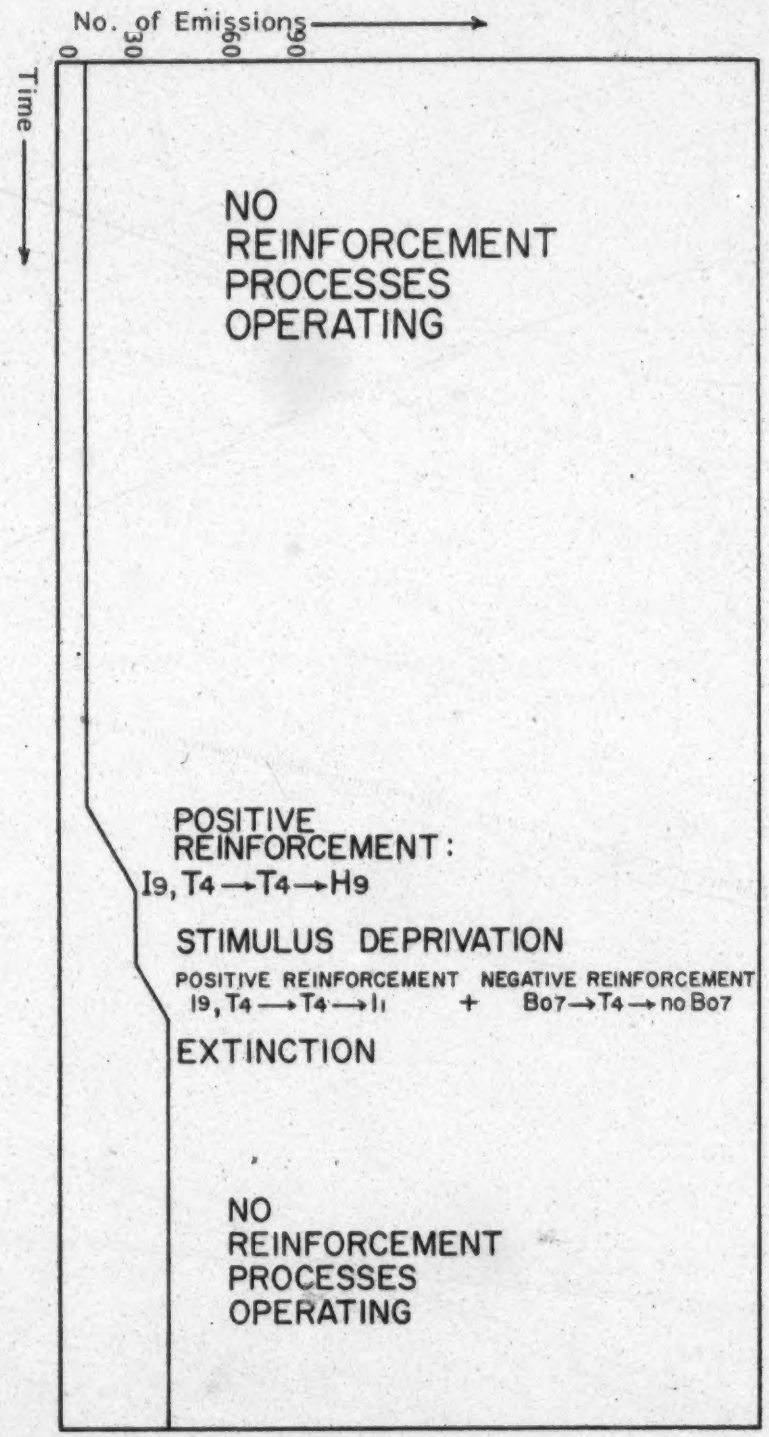
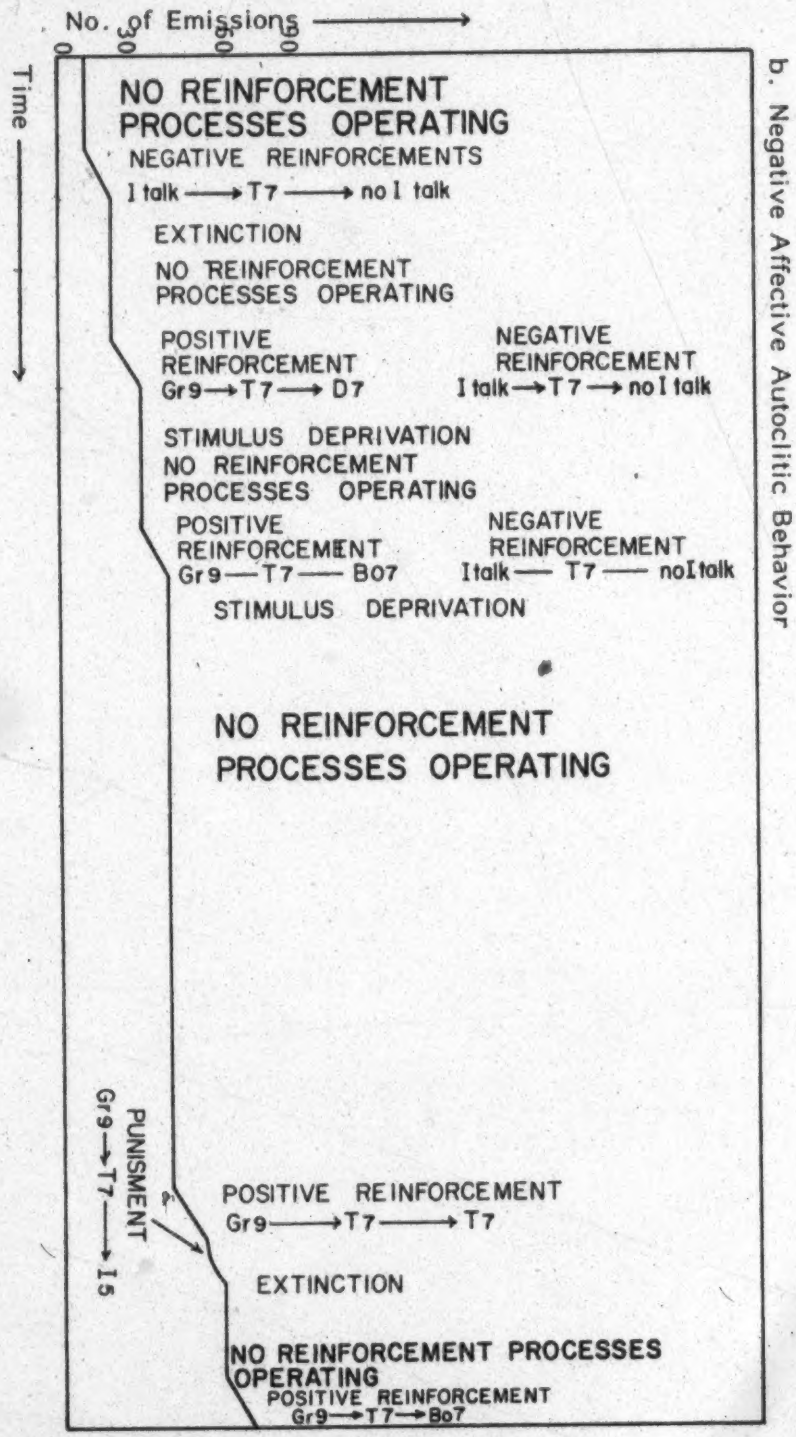
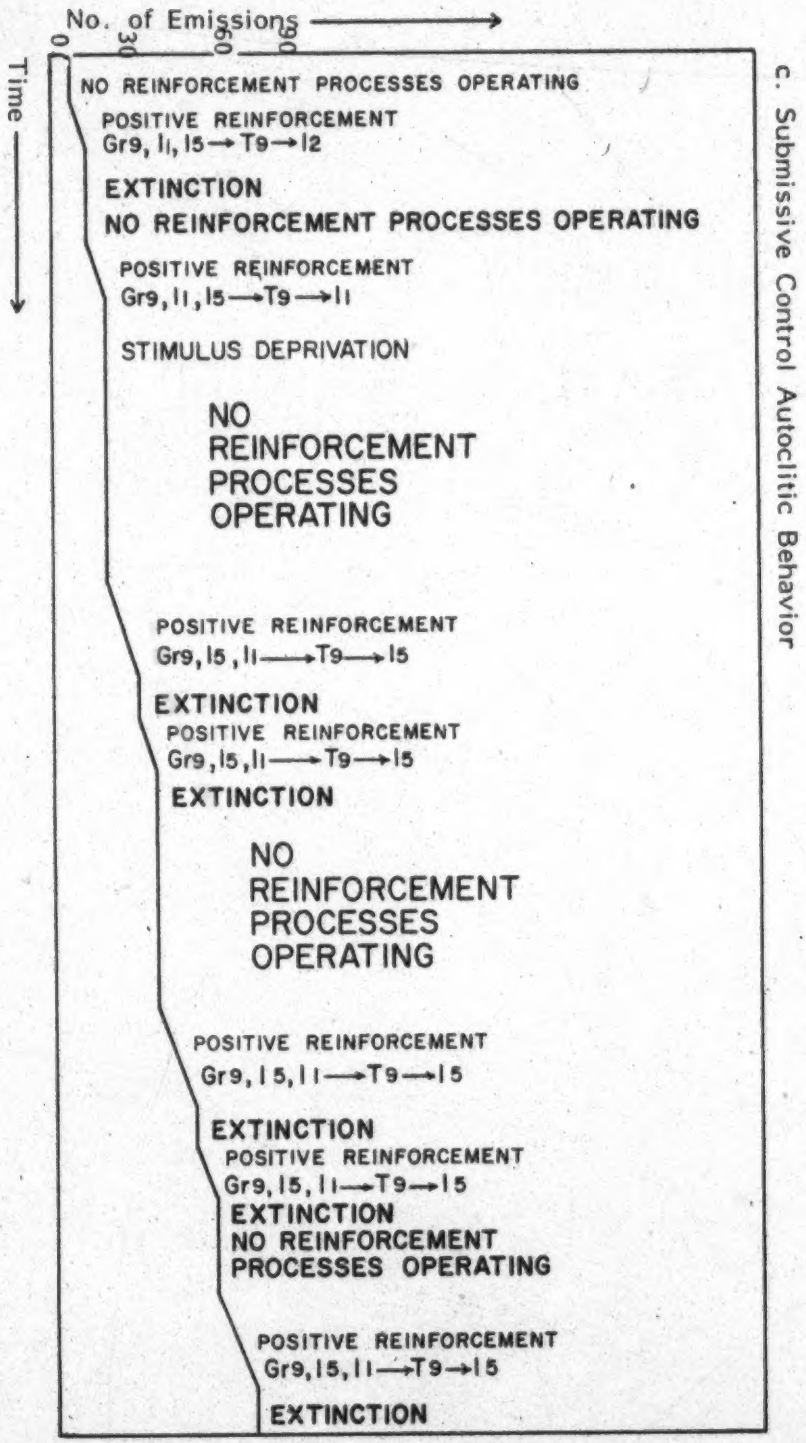


FIGURE 3

CUMULATIVE GRAPHS OF TOMMY'S OPERANTS


No. of Emissions
0
30
60
90
Time
b. Negative Affective Autoclitic Behavior
NO REINFORCEMENT PROCESSES OPERATING
NEGATIVE REINFORCEMENTS
I talk → T7 → no I talk
EXTINCTION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
Gr9 → T7 → D7
NEGATIVE REINFORCEMENT
I talk → T7 → no I talk
STIMULUS DEPRIVATION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
Gr9 — T7 — Bo7
NEGATIVE REINFORCEMENT
Italk — T7 — noItalk
STIMULUS DEPRIVATION
NO REINFORCEMENT PROCESSES OPERATING
PUNISMENT
Gr9 → T7 → I5
POSITIVE REINFORCEMENT
Gr9 → T7 → T7
EXTINCTION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
Gr9 → T7 → Bo7



c. Submissive Control Autoclitic Behavior

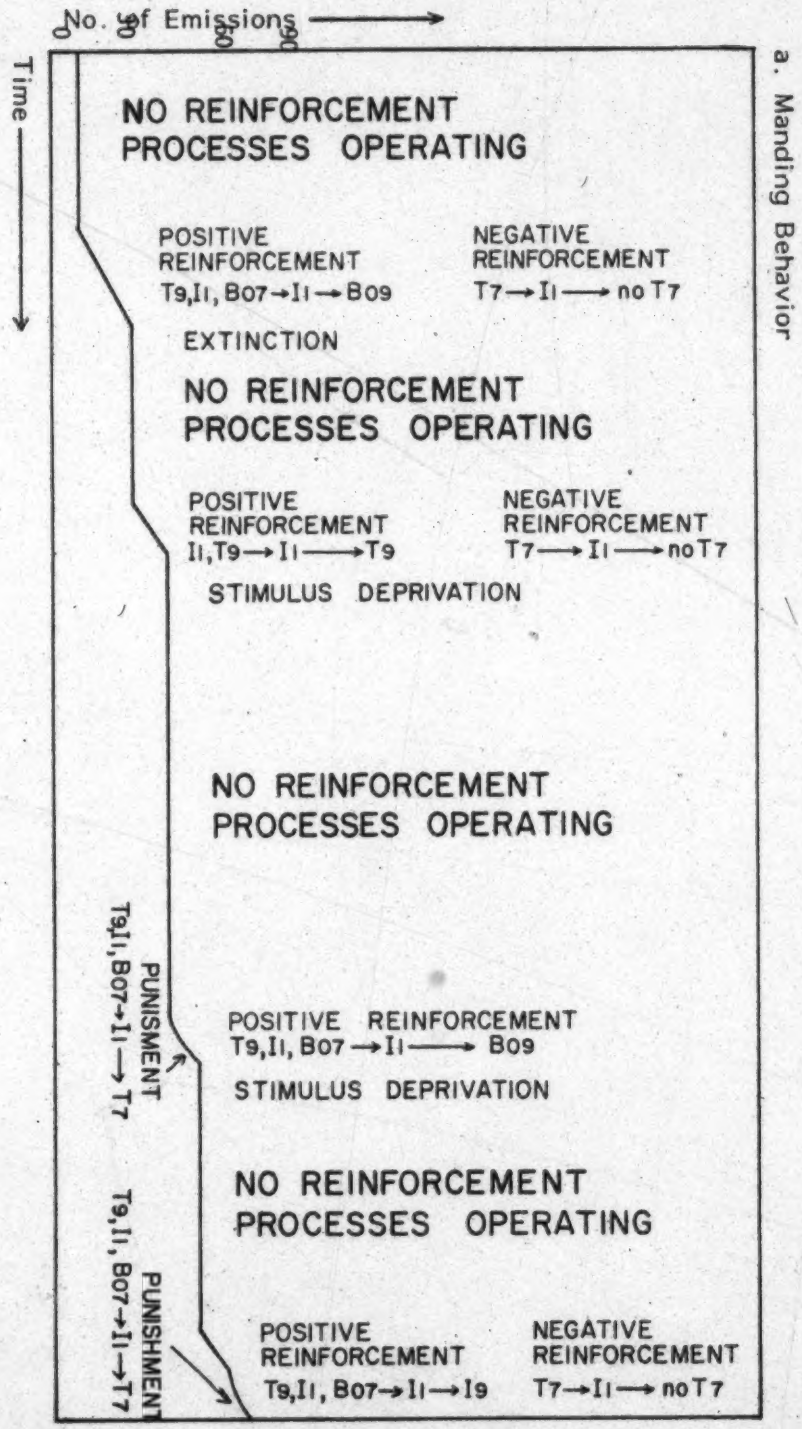
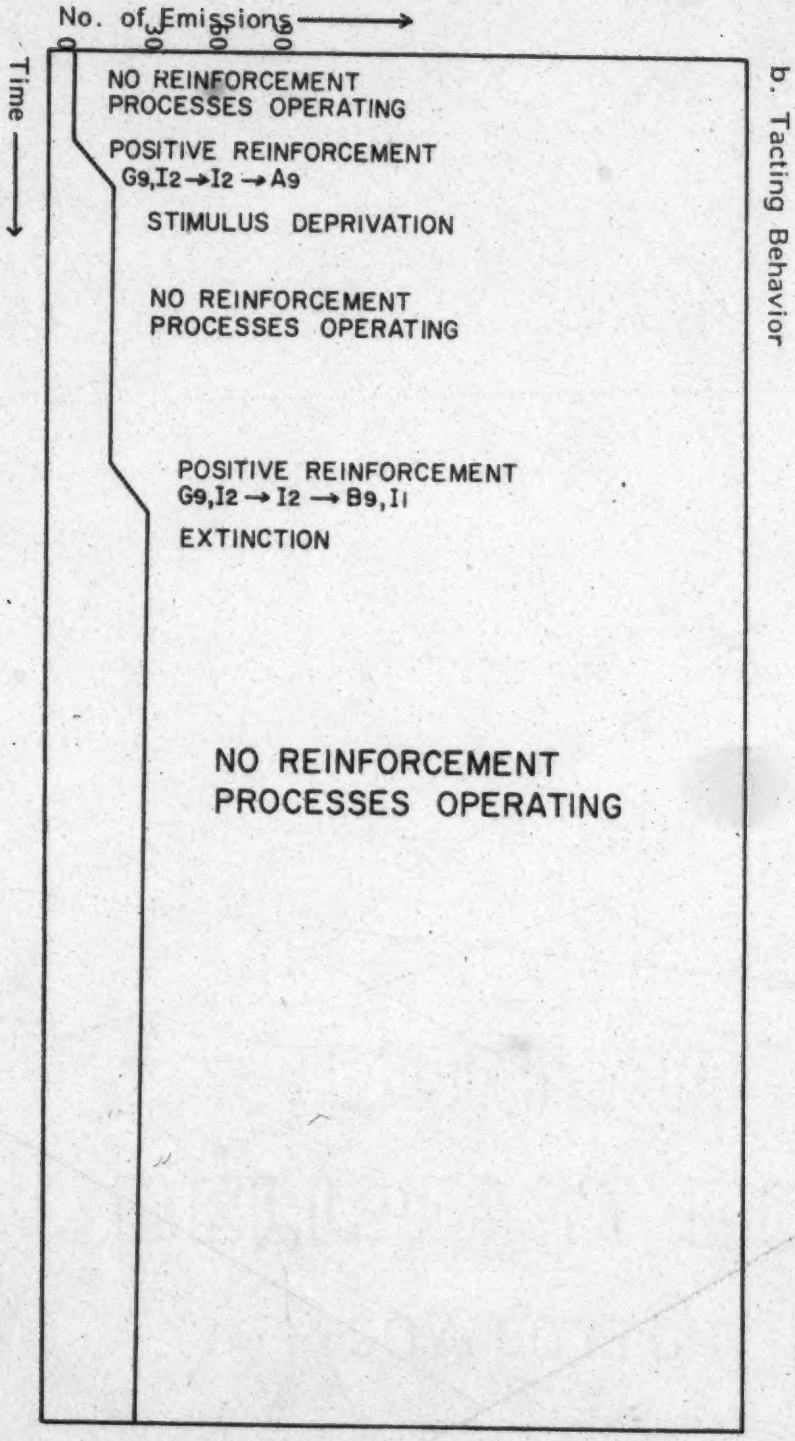
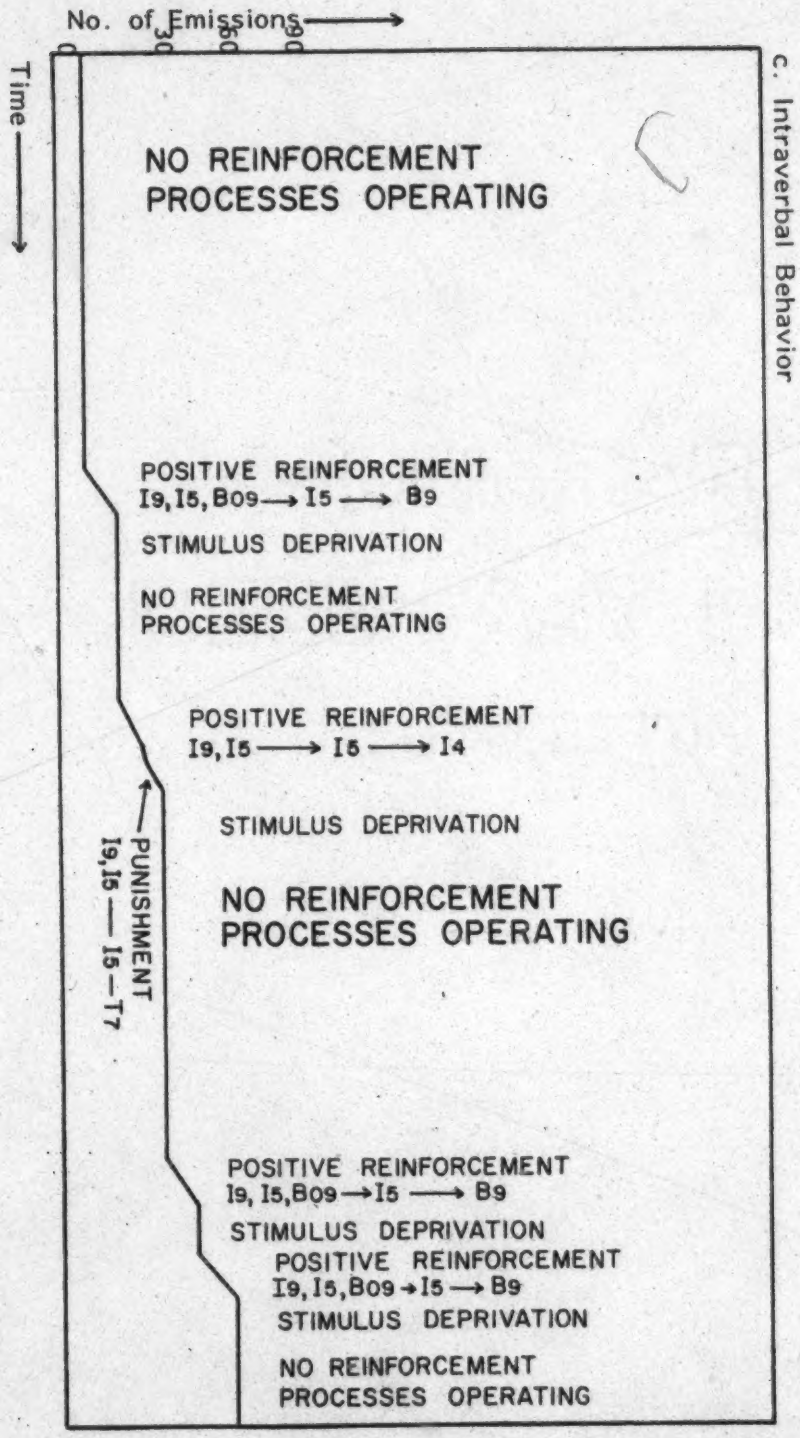
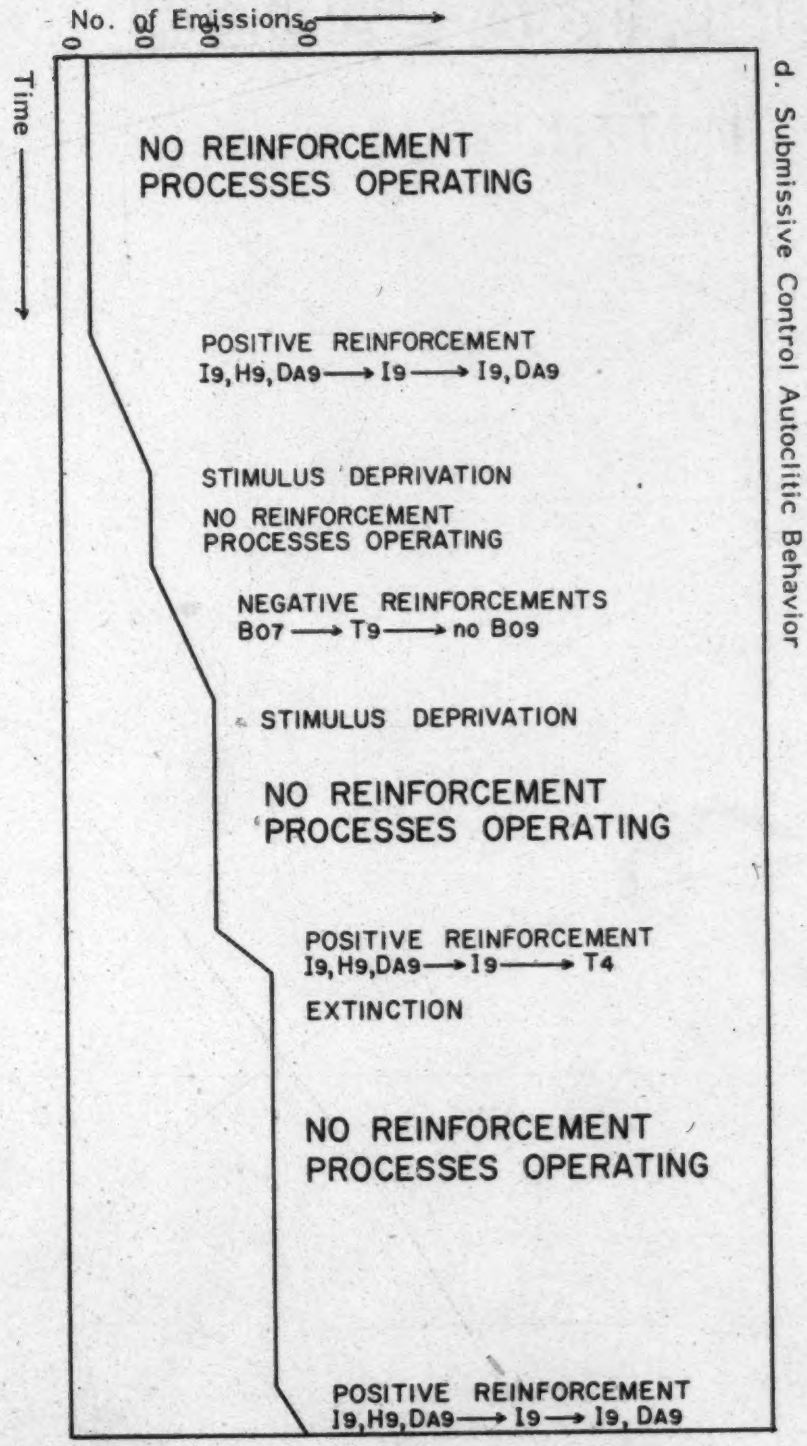


FIGURE 4

CUMULATIVE GRAPHS OF INSTRUCTOR'S OPERANTS


No. of Emissions
Time
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
G9,I2 → I2 → A9
STIMULUS DEPRIVATION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
G9,I2 → I2 → B9,I1
EXTINCTION
NO REINFORCEMENT PROCESSES OPERATING
b. Tacting Behavior


No. of Emissions
0
30
60
90
Time
c. Intraverbal Behavior
NO REINFORCEMENT
PROCESSES OPERATING
POSITIVE REINFORCEMENT
I9, I5, B09 → I5 → B9
STIMULUS DEPRIVATION
NO REINFORCEMENT
PROCESSES OPERATING
POSITIVE REINFORCEMENT
I9, I5 → I5 → I4
STIMULUS DEPRIVATION
NO REINFORCEMENT
PROCESSES OPERATING
PUNISHMENT
I9, I5 — I5 — T7
POSITIVE REINFORCEMENT
I9, I5, B09 → I5 → B9
STIMULUS DEPRIVATION
POSITIVE REINFORCEMENT
I9, I5, B09 → I5 → B9
STIMULUS DEPRIVATION
NO REINFORCEMENT
PROCESSES OPERATING


No. of Emissions
0
Time
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
I9, H9, DA9 → I9 → I9, DA9
STIMULUS DEPRIVATION
NO REINFORCEMENT PROCESSES OPERATING
NEGATIVE REINFORCEMENTS
B07 → T9 → no B09
STIMULUS DEPRIVATION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
I9, H9, DA9 → I9 → T4
EXTINCTION
NO REINFORCEMENT PROCESSES OPERATING
POSITIVE REINFORCEMENT
I9, H9, DA9 → I9 → I9, DA9
d. Submissive Control Autoclitic Behavior

discriminative stimuli for the operant response (Tommy's echoic behavior). This is reinforced by the presentation of submissive autoclitic behavior by Henry. The first period of increase is terminated when the instructor and Tommy cease to provide the necessary discriminative stimuli upon which the contingency depends (stimulus deprivation). The second period of increase is accounted for by two contingencies of reinforcement - one positive and one negative. The first two terms (i.e. stimulus and response) of the positive contingency of reinforcement are identical to those of the contingency operative during the first increase period. However, in the second increase period, the Instructor's manding behavior replaces the submissive autoclitic behavior of Henry as the positive reinforcing stimulus. The contingency of negative reinforcement which operates during the second increase period involves the withdrawal of Bob's negative affective autoclitic when Tommy's echoic behavior occurs. The operation of the positive reinforcement contingency is terminated when the Instructor withdraws his reinforcing manding behavior (extinction). The contingency of negative reinforcement becomes inoperative when Tommy's echoic behavior has removed the unpleasant stimulation occasioned by Bob's negative autoclitic behavior. Once Tommyhas escaped the negative stimulation presented by Bob, he may continue to emit echoic behavior in order to avoid future occurences of Bob's negative autoclitic. However, this kind of long-term

avoidance response doesn't require as high a rate of emission as the escape response necessitated, and no noticeable fluctuations in the cumulative graph record are witnessed as a result of this process.

Outside of the two increases in emission rate and the following decrease periods, Figure 3-a is made up of two large areas in which no reinforcement processes appear to be operating. While this is entirely expected since no graph-slope fluctuation (learning as operationally defined) occurs in these areas, these periods were used as important experimental controls. Following a procedure similar to that mentioned in Chapter 3, the same analyses which divulged the reinforcement contingencies discussed above, were applied to these 'no-movement' areas. When the analyses failed to yield any results for these periods, both the analytical procedures used, and the contingency information divulged achieved validity in terms of the actual empirical evidence presented by the group interaction, and in terms of Skinner's principles of reinforcement. The converse of this latter point is perhaps most important. Given the kind of controlled empirical evidence presented above, it can no longer be reasonably questioned that human behaviors are functionally controlled by the same kinds of principles which Skinner elicited in animal laboratories.

Figures 3-b and 3-c, as well as Figures 4-a to 4-d, can be interpreted in the same manner as Figure 3-a. In all of these cumulative graphs the dynamic manipulation of a particular class of

behaviors by the operations of positive and negative reinforcement, extinction and stimulus deprivation is schematically represented. Before considering Figures 3 and 4 in a more general way (which will focus on the interaction of the dyad consisting of Tommy and the Instructor) a brief account should be given of the operation of punishment in Figures 3-b, 4-a and 4-c.

Generally speaking, the effect of punishment on the rate of emission of a particular verbal operant is to produce some kind of irregularity in the overall pattern of emission rate. For the purposes of the present analysis, punishing stimuli were identified from those classes of aversive stimuli operative in contingencies of negative reinforcement. The presentation of such a stimulus following the emission of a particular operant should have a punishing effect on that operant. While punishment is no doubt active at many times during the course of a particular group interaction its effects appear on a cumulative graph during those periods of operant increase occasioned by positive reinforcement. Since the nature of negative reinforcement is to avoid aversive stimuli, punishment does not operate alongside an effective negative contingency concerned with the same verbal units. The presentation of an aversive stimulus along with a positive reinforcing stimulus, following the emission of an increasing operant, somewhat obfuscates the normal effect of the positive reinforcer and the cumulative graph shows small irregular decreases at these points. The punishments shown in Figures 3 and 4 conform to

this general pattern.

When considering Figure 2, it was mentioned that the unique relationship between Tommy and the Instructor should become clearer with the aid of Figures 3 and 4. It has already been noted that, in the second increase period shown in Figure 3-a, manding behavior by the Instructor positively reinforces Tommy's echoic behavior. In Figure 3-b, the most prevalent contingency, which accounts for the first three periods of operant increase, involves the withdrawal of verbal behavior by the Instructor after the emission of negative affective autoclitics by Tommy. This situation is reversed in Figure 3-c, with verbal behavior by the Instructor (mands, tacts, and echoics) serving to reinforce positively Tommy's submissive autoclitic behavior. The picture which unfolds from looking at Figure 3 is one of Tommy heavily influencing the verbal output of the Instructor. When Tommy emits negative affective autoclitics, the Instructor quits speaking; when he emits submissive control autoclitics, the Instructor responds by increasing his verbal output.

Figure 4 does not give the same kind of specific account of the interaction between the Instructor and Tommy. From Figure 2 it was recognized that the Instructor, besides receiving and giving reinforcement and stimulation from and to Tommy, has this same kind of relationship with Bernie and Bob. The more wide-spread involvement of the Instructor in the group as compared with Tommy is again manifested in Figure 4. The only times that Tommy really

enters into the Instructor's personal contingencies are shown in Figure 4-a. Here the withdrawal of negative autoclitics by Tommy negatively reinforces the manding behavior of the Instructor; submissive autoclitics by Tommy act as part of the stimulus situation for the same Instructor behavior when it is positively reinforced. Echoic behavior by Tommy plays a small role in Figure 4-d as a positive reinforcer during the third period of increase shown for the Instructor's submissive autoclitic behavior.

It is really from Figure 3 that the very important relationship existing between Tommy and the Instructor during the fifteen minutes of group action is elucidated. Figure 4 does not deal as specifically with this dyadic interaction because of the involvement of other group members in the Instructor's contingencies. Nonetheless, it cannot be doubted that Tommy exerts a great amount of control over the verbal output of the Trainer. When Tommy pays attention (submissive listening) to the Instructor, the Instructor's interaction increases; when Tommy doesn't pay attention (negative, disruptive autoclitics) the Instructor tends to interact at a much lower level in terms of his overall verbal output.

Returning now to the shortcomings of the analysis reported in Chapter 3, it is the writer's conviction that most of these have been answered by the methods of analysis reported in the present chapter. The extension of the Skinner interaction-analysis

categories to include an area in which submissive listening and attentive behavior can be coded, in association with the technique of coding an equal number of acts for each group member, does away with the advantageous position of the high vocal interactors. It provides a more comprehensive model of group interaction in terms of reinforcement principles and processes.

The inclusion of the processes of extinction, stimulus deprivation and punishment in the analysis also provides a more dynamic interpretation of the group history of particular individual members. In place of limiting the analysis to periods of regular operant increase, both operant decrease and non-systematic increase were brought under the control of the analysis.

Finally the dynamic mapping interpretation offered in this Chapter took into account subtle changes in reinforcement contingencies as the group interaction progressed. As noted earlier, it can no longer be questioned that reinforcement principles and processes provide a powerful explanation for the behavior of human subjects in a naturalistic, non-manipulated environment.

CHAPTER 5

SUMMARY

The purpose of this chapter will be succintly to summarize and tie together much of what has been said in the previous chapters. In addition, attention will be given to the practical and theoretical implications of the research findings and to future research directions which seem to follow naturally from the work reported in these pages.

As an initial attempt to develop a crucial test of B.F. Skinner's system of analysis of 'verbal behavior' and his theory of reinforcement, having in mind the reactions of the anti-behaviorist critics, of whom Noam Chomsky is probably best known; the project has substantially increased knowledge in these areas. In addition to the theoretical and philosophical refutations of Chomsky's criticisms given in Chapter 1, a strong empirical refutation now presents itself. Chomsky's allegations that the concepts and procedures of reinforcement theory do not survive the transition from the rigor of the animal experimental laboratory to an analysis of human verbal behavior in a naturalistic environment; and that a behavioristic approach to human issues of wide significance and social concerns is not justified in terms of results achieved in these areas, can now be seriously questioned from an empirical standpoint. The present research work has shown that principles of reinforcement operate to control and account

for human performance even in a situation which is not artificially constructed by the experimental team. There seems to be nothing uniquely different about verbal behavior which allows it to operate independently of, and in a different manner from, other types of behavior. While Chomsky was justified in 1957 in stating that Skinner had declared a program for an analysis of verbal behavior but had not produced a completed body of experimental work to substantiate his claims, such criticism is (in view of the present findings) no longer unanswerable. Indeed, it would now seem to be Chomsky's turn to demonstrate the relevance of his transformational grammar in explaining human use of language in a natural situation which includes more than the production of written phrases and sentences.

The fact that the principles and concepts of behavioral psychology adhere to the scientific laws of objectivity, economy and causality allows for the development of specific research investigations which either validate or dismiss operational hypothesis about human behavior. The behaviorism of such scientists as Meyer and Weiss, who demanded the recognition of objectivity and determinism as the simplest assumptions necessary to explain the facts of human behavior, helped open the doors to a scientific inquiry into the nature of this complex subject matter. Meyer's definition of behavior which has social significance as the subject of psychological experimentation is amazingly similar to Skinner's definition of verbal behavior. The willingness of these

psychologists to recognize and attempt to deal scientifically with the reality of human behavior in its environmental context represents a healthy tradition in experimental psychology. The present research study has tried to build on this firm foundation in attempting to provide a functional model of human verbal performance.

Since a prodigious amount of literature under the general rubrics of 'reinforcement theory and its application' or 'behavioral modification' has been accumulated over the past two decades, it should be made absolutely clear what is unique and progressive about the project outlined in this thesis. Many research studies (e.g. Hall et al., 1968) point to the effectiveness of specific responses (smiling, nodding, paying attention etc.) in altering the rates of emission of particular words, phrases, or other behavioral units in short-term environments. Other studies (e.g. Phillips et al., 1971) indicate the effectiveness of long-term token reinforcement programs in extinguishing socially undesirable behaviors and replacing them with socially accepted behaviors. While both these types of research have demonstrated that principles of reinforcement operate in specially constructed environments to control selected instances of behavior, no previous studies have attempted to study all socially significant behavior occurring in a non-manipulated environment in terms of a dynamic model of reinforcement contingencies. Put another way, no previous attempt has been made to determine whether the fluctuations in emission rate of all verbal behavior (quantified in a manner which

lends itself to experimental investigation) in a non-manipulated environment can be accounted for in terms of reinforcement principles.

Highly specific approaches to the problem of understanding the functioning of reinforcement in a human situation ignore much vital information. Unless the totality of behavior and environment is taken into account, false conclusions may be reached. The 'smile', 'nod' or token may not be effective unless they occur in combination with other behaviors or environmental cues. A crude behaviorism which views reinforcement as a quantity of food dropped into a dish following the clicking of a magazine will never come to grips with the complexities of human behavior. Simply stated, a much more dynamic and sophisticated brand of behaviorism is needed. In an absence of many experimental controls the present work has included the development of sophisticated methodologies and techniques. These have been devised to compensate for the limitations of the human observer and experimenter. With these advances it is no longer necessary to limit the scope of behavioral research to severely controlled laboratory studies of animal behavior, or simplistic pre-determined contingency 'experiments' with human subjects.

The general findings of the present research program have already been noted at the end of Chapter 4. The success of the project in demonstrating that all of verbal behavior can be quantified within a slightly modified version of the verbal operant system proposed by Skinner in 1957, and that any fluctuation in the emission rates of

operants can be accounted for in terms of the principles of reinforcement theory, points to the existence of definite causal connections between the physical environment and human speech reinforcers and between different elements of human verbal behavior. The directions which these findings open for future research are manifold. The final section of this chapter will outline what the writer feels to be the immediate priorities for further work in a behavioral analysis of human verbal behavior, keeping in mind necessary improvements in, and extensions of the methodologies, techniques and theoretical resources utilized thus far.

While the basic principles and concepts which Skinner uses to explain behavior have been shown to have great applicability to a non-controlled human situation, some minor problems still exist in this area. Firstly, the processes of punishment and extinction seem to require greater conceptual clarity. Skinner considers two types of punishment - the withdrawal of a positive stimulus, (type 1) and the presentation of an aversive stimulus (type 2). Extinction involves the withdrawal of a reinforcing stimulus which may be positive (in the case of positive reinforcement) or aversive (in the case of negative reinforcement). The supposed difference between extinction and punishment of the first type lies in the fact that for extinction to operate, the operant being extinguished must have been conditioned, prior to the withdrawal of the reinforcing stimulus, by a contingency of positive or negative reinforcement. Punishment

(type 1) can only be said to operate if the operant being punished has not been conditioned immediately prior to the withdrawal of positive stimulation. Extinction differs from punishment of the second type in a more obvious manner. In extinction a negative reinforcing stimulus may be withdrawn in order to curtail a contingency of negative reinforcement, but at no time does the presentation of an aversive stimulus count as extinction.

While there is no theoretical problem involved in these definitions if these subtle distinctions are recognized, it is questionable to what extent such subtle differentiations are amenable to a practical state of affairs. How, for example, can one be sure that type 1 punishment is operating rather than extinction? In a human environment involving numerous contingencies of reinforcement which are changing continually it is not always clear which operants have just been conditioned and which haven't. The reasonableness of the distinction between type 1 punishment and extinction depends upon the ability of the experimenter to determine whether or not a significant time lapse has occured between conditioning and the withdrawal of a positive reinforcement. This presents no problem in a rigidly controlled laboratory environment where one does not encounter the phenomena of stimulus deprivation (see Chapter 4). In such an environment an operant is either conditioned, extinguished, or punished. However, in the human situation, stimulus deprivation does operate. If a decrease in the rate of emission of a particular operant is

due to stimulus deprivation and not to extinction do we call the withdrawal of a positive reinforcing stimulus when the discriminative stimulus situation is restored, punishment or extinction?

Another point which causes uncertainty is the temporal order of stimuli, responses and reinforcers. If punishment is the withdrawal of a positive stimulus, supposedly stimulus deprivation is a form of punishment. Skinner however only illustrated punishment with examples of the withdrawal of, or presentation of, stimuli which succeed the response.

It may even be difficult to accept that punishment (type 2) ever does operate. Certainly if one accepts the idea of conditioning in all its aspects, is there ever such a thing as a response that isn't being conditioned in some way or other? In Cumulative Record (p. 48-70) Skinner observes that extinction causes many of the same behaviors in rats as punishment does - i.e. aggression, apathy, inconsistency, etc. If behavioral repercussions are so similar, is it really necessary to maintain these subtle terminological distinctions? While Skinner's basic notions of positive and negative reinforcement presented no pragmatic problems in attempting to implement a behavioral analysis of human verbal behavior, the operations of more peripheral processes, such as extinction and punishment, need more clarification if they are to be used with an equal degree of success.

A second theoretical issue concerns the importance of the stimulus situation in controlling and determining behavior. Skinner's entire work has been concerned with establishing a science of behavior primarily concerned with the control which subsequent events exercise over particular responses which precede them. The outcome of this enterprise has been that rigid lines of demarcation have been drawn between so-called 'operant' conditioning and 'classical' or 'respondent' conditioning. This distinction has been unfortunate in that it has served unduly to limit the orientations of research workers in the area of behavioral science. Experiments in operant conditioning procedures and techniques are considered by many to be scientifically valid only if they adhere to these lines of demarcation. Skinner himself, while recognizing that respondent conditioning does operate in particular instances, and that even in 'operant' conditioning discriminative stimuli exercise some control over behavior, tends largely to ignore this fact in favor of an in-depth analysis of reinforcers and their effect on behavior. Nonetheless the decision is arbitrary. If two events occur in a chain of other events it is really an arbitrary decision whether to look at these two events in terms of one event preceding the other, or alternatively in terms of one act following another.

In truth, Skinner's concern with reinforcing stimuli is more pragmatic than theoretical. While it is very difficult to quantify all the physical properties of an experimental space, it is not so difficult

to quantify the physical properties of an experimentally manipulated reinforcing event. While this produces nice clean results in the animal laboratory, the convenience is lost in naturalistic human settings. In the absence of any experimental manipulation, the research worker finds that reinforcing stimuli are just as difficult to recognize as are preceding (discriminative) stimuli. The pragmatic advantage of concentrating solely on subsequent events in terms of controlling behavior is lost. There seems therefore to be no valid reason for limiting the scope of such investigations to operant phenomena as defined by Skinner. Indeed an overall picture of causal connections between behaviors, and between behaviors and environment, would be enriched by a closer scrutiny of the physical aspects of the stimulus situation. The rigorous scientific work of Ivan Pavlov on the conditioned reflex offers a sound empirical base on which such future work could rest. Pavlov's later work on the 'second signalling system', unfortunately cut short by his death in 1936, must have special relevance for any work which attempts a behavioral analysis of human speech. In The Conditioned Reflex (1935) Pavlov states a theoretical position very similar to that adopted throughout the present thesis when he states:

> "It cannot be doubted that the fundamental laws governing the activity of the first signalling system (motor responses) must also govern that of the second (verbal responses) because it, too, is activity of the same nervous tissue." (I.P. Pavlov - Selected Works, Ed. 2 p. 262)

Increased attention to the theoretical matters just discussed, coupled with methodological and technical advances, should yield increasingly encouraging results in behavioral studies of human communicative behavior. The use of new and better coding systems, the implementation of on-line computer processing which the research worker could consult in the course of the experimental period, and the provision of methods to relay these immediate feed-backs to an experimenter involved in the actual verbal episode itself, are a few of the many possible technical innovations which should contribute to these over-all pictures.

In terms of immediate directions for future research work, three avenues seem to be stimulated by the findings of the present project. In order to test the generalization of the findings reported in this thesis to different types of social interaction, replication studies must be carried out using other training or instructional techniques, other sizes and samples of subjects, and other environmental settings. Emphasis here might be given to the elucidation of reinforcement contingencies which seem to belong specifically to a particular group treatment or a particular subject population.

As our knowledge of the operation of specific contingencies increases it should become increasingly possible to predict the verbal behavior of a particular group of individuals before it happens. Studies which will be concerned with the ability of the experimenter to predict future behavioral patterns on the basis of an in-depth analysis of past

behavioral patterns, will form an important second area for investigation.

Finally, it should eventually be possible to set up programs geared to shape the verbal behavior of human subjects in various ways. Once a full knowledge of the stimuli and reinforcers which control the verbal responses of an individual speaker has been obtained by methods similar to those utilized in the present project, careful manipulation of presented stimuli and reinforcers should enable such shaping to take place. The practical application of such a possibility is obvious for many areas of human society. In psychotherapy the maladaptive verbal behavior of psychiatric patients could be extinguished and normal speech patterns instituted in their place. In education, the student handicapped by verbal awkwardness or extreme reticence could be helped to overcome these difficult behavicral problems.

While some of these research directions are not without a certain speculative quality, they do not seem, to the writer, to be impossibilities or non-supported fantasies. The present thesis has pointed to the operation of causal connections in the production, maintenance and control of human verbal behavior. The hypotheses concerning verbal behavior put forth by B.F. Skinner, along with his more general principles and laws of reinforcement have been shown, for the most part, to be valid and to have great promise for the disciplined scientific study of human verbal performance.

SELECTED REFERENCES

Anderson, R.M., A Comparison of Bales' and Flanders' System of Interaction Analysis as Research Tools in Small Group Instruction, Unpublished doctoral dissertation, University of Alberta, 1971.

Bales, R.F., Interaction Process Analysis; A Method for the Study of Small Groups, Reading, Mass: Addison-Wesley Pub. Co., 1950.

Bales, R.F., Personality and Interpersonal Behavior, New York: Holt, Rinehart and Winston, 1970.

Bedecki, R., Patterns of Structure and Process in Learning Groups, Unpublished master's thesis, University of Alberta, 1972.

Berne, E., Games People Play: The Psychology of Human Relationships, New York: Grove Press, 1964.

Bion, W.R., Experiences in Groups, London: Tavistock Publ., 1961.

Bloomfield, L., An Introduction to the Study of Language, New York: Holt, 1914.

Bloomfield, L., A Set of Postulates for the Science of Language, Language, 1926, 2, pp. 153-164.

Bloomfield, L., Language, New York: Holt, 1933.

Burnet, James (Lord Monboddo), Of the Origin and Progress of Language, 1774. Menston: Scolar Press, 1967.

Chomsky, N., Review of Skinner's "Verbal Behavior". Language, 1959, 35, pp. 26-58.

Chomsky, N. Language and Mind, New York: Harcourt, Brace and World, 1968.

Chomsky, N., The Case Against B.F. Skinner. New York Times Book Review Section, 1971, 17, no. 11, pp. 18-24.

De Laguna, G.A., Speech: Its Function and Development, 1927. Bloomington: Indiana University Press, 1963.

Esper, E.A., Mentalism and Objectivism in Linguistics: The Sources of Leonard Bloomfield's Psychology of Language, New York: American Elsevier Pub. Co., 1968.

Flanders, N., Interaction Analysis in the Classroom: A Manual for Observers, Ann Arbor: University of Michigan, 1960.

Flanders, N., Analyzing Teaching Behavior, Reading, Mass: Addison-Wesley Publ., 1971.

Foulkes, S.H., Therapeutic Group Analysis, London: Allen and Unwin, 1964.

Guthrie, E.R., The Psychology of Learning, New York: Harper, 1935.

Hall, R., et al, Effects of Teacher Attention on Study Behavior, J. of Applied Behavior Analysis, 1968, 1, pp. 1-13.

Hartley, D., Observations on Man, his Frame, his Duty, and his Expectations, London, 1749.

Herder, J.G., Reflections on the Philosophy of the History of Mankind, 1772. ed. by L. Krieger, Chicago: University of Chicago Press, 1968.

Kohler, W., The Mentality of Apes, Transl. by E. Winder, New York: Harcourt Brace, 1925.

McLeish, J. The Science of Behavior, London: Barrie and Rochliff, 1963.

McLeish, J., Matheson W. and Park, J., The Psychology of the Learning Group, London: Hutchinson university Library, 1973.

Mann, R.D., with Gibbard, G.S. and Hartman, J.J., Interpersonal Styles and Group Development, New York: Wiley and Sons, 1967.

Matheson, W.E., The Structure of Small Learning Groups. Unpublished doctoral dissertation, University of Alberta, 1971.

Meyer, M., The Fundamental Laws of Human Behavior, Boston: Badger, 1911.

Meyer, M., Psychology of the Other-One, Columbia, Missouri: Missouri Book Co., 1921.

Mill, J.S., A System of Logic, 8th Ed. New York: Harper, 1891.

Nagel, E., The Structure of Science, Problems in the Logic of Scientific Explanation. London: Routledge and Kegan Paul, 1961.

Paul, H., Principles of the History of Language, Transl. by H.A. Strong., Lond, 1889.

Pavlov, J.P. Selected Works, edited by Koshtoyants. Moscow Foreign Languages Publishing House, 1943.

Phillips, E.L., et al, Achievement Place: Modification of the Behaviors of the Pre-delinquent Boys within a Token Economy. J. of Applied Behavior Analysis, 1971, 4, pp. 45-60.

Powdermaker, F., and Frank, J.D., Group Psychotherapy: Studies in Methodology of Research and Therapy, Cambridge, Mass: Harvard University Press, 1953.

Sechenov, I.M., The Reflexes of the Brain, 1863. Transl. in A. Subkov (Ed.) Selected Works of Ivan Sechenov, Moscow: State Publishing House, 1935.

Skinner, B.F., The Behavior of Organisms: An Experimental Analysis, New York: Appleton-Century-Crofts, 1938.

Skinner, B.F., Science and Human Behavior, New York: MacMillan, 1953.

Skinner, B.F., Verbal Behavior, New York: Appleton-Century-Crofts, 1957.

Skinner, B.F., Cumulative Record, Revised Edition, New York: Appleton-Century-Crofts, 1961.

Skinner, B.F., Contingencies of Reinforcement: A Theoretical Analysis, New York: Appleton-Century Crofts, 1969.

Tooke, J.H. Diversions of Purley, 1786. London: William Nichols, 1860.

Weiss, A.P., The Relation Between Physiological Psychology and Behavior Psychology. Journal of Philosophy, Psychology, and Scientific Method , 1919, 16, pp. 626-634.

Weiss, A.P., The Aims of Social Evolution. Ohio Journal of Science, 1923, 23, pp. 115-134.

Weiss, A.P., Linguistics and Psychology. Language, 1925, 1, pp. 52-57.

Whitney, W.D., The Life and Growth of Language, New York: Appleton, 1875.

Whitney, W.D., General Considerations on the Indo-European Case-system. Transactions of the American Philogical Association, 1882, 13, pp. 88-100.

Woodworth, R.S., and Mary R. Sheehan, Contemporary Schools of Psychology, 3 Ed. New York: Ronald Press Co., 1964.

Wundt, W., Principles of Physiological Psychology, Vol. I. Transl. of 5 Ed., 1902, by E.B. Titchener. New York: Macmillan, 1904.

APPENDIX 1

RULES AND CONVENTIONS FOR THE CODING SYSTEMS

RULES OR CONVENTIONS FOR CODING

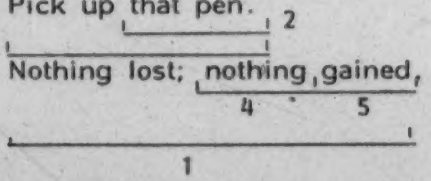
EIGHT-CATEGORY SYSTEM

1. Wherever possible code 1, 2 or 3. These categories have priority. Echoics, Intraverbals and Autoclitics are all stimulated by these operants. Behaviors in categories one to three provide the foundations for human communication.

2. (a) The length of an act is generally a phrase. Thus, commas, conjugations, prepositions, etc. usually signify the end of one act and the beginning of another. However, the chosen act must "make sense", and must clearly belong to one of the six categories. This means that the act must be capable of being understood as an integral part of a contingency of reinforcement and must have a specific function.

   (b) In a phrase containing elements of categories other than the most salient category, these elements can be noted by subsuming the lesser categories under the major category.

Example:



(c) In certain cases where an act clearly contains elements of more than one category and it is not possible logically to separate the act into two acts, and subsuming is not satisfactory, the act may be double-coded. For example the salient component of the phrase: "Nothing lost; nothing gained" may be a mand since it gives advice, or a tact if it describes a situation, or both of these if both these functions are served. (Note that this rule applies only for categories 1, 2 and 3. If other categories are involved see rule 1.)

3. Category 3 catches "defensive behavior and "response generalization".

(a) Code 3 rather than 2 when the operant is under the control of the physical properties of a stimuls occasion, but the relationship between stimulus and operant is not commonly reinforced by the verbal community; and hence, the physical reference of the response is not readily accessible to the listener.

(b) Code 3 rather than 5 when the operant is stimulated by the physical occasion rather than a preceding thematically related stimulus.

In a fantasy chain an initial 3 is often followed by a series of 5's which elaborate on the theme. However when some new element is introduced into the fantasy

and it can be reasonably viewed as a 3, then the convention is to do so.

Further, code 3 rather than 5 if coding in the 3 category serves to increase the psychological meaning of the operant in terms of causality. (Also see rule 1.)

(c) Code 3 rather than 2 when the exact physical situation which would imply a 2 coding is no longer present in its entirety, but is partial in affect so as to warrant a tact coding, eg. anecdotes or comments about past or near past.

4. Coding of single autoclitics:

(a) Code reponse of the form "well", "yeah", "no", "you know", 6.1 where the main purpose of the operant is to gain attention. This can usually be ascertained if other responses by the same individual follow such a response.

(b) Single word autoclitics other than initial 6's which occur in the body of a phrase are generally considered trivial, and are not coded by themselves unless they serve a distinct function separate from the overall context in which they occur.

Example: So, Linda, it's nice to see you.

In this example "and", "'s", and "to" are not coded by themselves, but the initial "so" is. The initial "so" has, a particular function which the other autoclitics in this

example do not have. (i.e. that of gaining attention.)

(c) If an initial autoclitic interrupts or cuts across another speaker, it is coded as 7 in that it is a negative action.

5. Laughter is usually coded as autoclitic - the specific type depending on its specific function. However, in general laughter, only the first person to laugh is given a 6; the rest being coded as 4's.

6. The autoclitic category catches most of what Bales calls "non-verbal" behavior. Because of the breadth and importance of this area of behavior the category has been broken down into three parts so as to increase its discriminatory power:

(a) If a behavior is disruptive (example: clicking cigarette lighter, blowing nose, clearing throat, etc., while another is talking) it is coded as 7. Positive behaviors such as laughing at a joke are also affective and are coded 7.

(b) The same behavior as in (a), when occuring in periods of silence, are coded 6 when there is an obvious attempt to draw attention to oneself (example: lighting a cigarette in a period of silence).

(c) Autoclitics which tell us something of the condition of the speaker, or the circumstances under which he emits an operant are coded 8.

Example: "I see where" ...

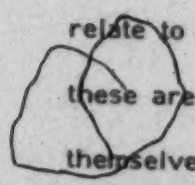
"I dearly wish" ... etc.

Laughter may be coded 8 if it tells you something about the condition of the speaker or of the strength of near-by operants.

7. Pointings and dramatizations which accompany spoken operants, are usually coded 8. However in special cases they may qualify in other categories. Example: If John asks "Where is my tie?" and his wife points to the tie in question, this pointing would qualify as a 2.

8. Code single pronouns by themselves, as 2 only when an obvious gesture relates them to physical stimuli. Otherwise do not code single 2's of this type by themselves.

9. Words like "that", "this", or "it" follow the same formula as in 8, with the addition that forms may also qualify as 5's if they relate to previous spoken operants. However here again, these are generally trivial forms and are not coded by themselves.



Example: "That's true" is coded as a 7 or 8 depending on the circumstance. The intraverbal "that" is not coded by itself.

TEN-CATEGORY SYSTEM

Almost exactly the same definitions, rules, and conventions of coding apply to the ten category system as apply to the eight category system. The only exception is that it now becomes necessary to decide whether control autoclitics are dominant or submissive; and whether affective autoclitics are positive or negative before coding these responses.

APPENDIX 2

INTERACTION BY CATEGORIES AND PEOPLE FOR PSYCHOTHERAPY GROUPS

INTERACTION BY CATEGORIES AND PEOPLE FOR TAVISTOCK SESSION 1 - RAW FREQUENCIES

	Ron	Lois	Katie	Carol	Ellen-Ann	Lilly	Nancie	Trainer	Group
Mand	7	1	50	0	0	26	63	21	168
Tact	15	1	32	1	1	23	28	56	157
Extended Tact	19	0	53	0	0	37	27	20	176
Echoic	106	11	190	6	28	80	85	40	546
Intraverbal	44	0	341	0	0	79	65	49	578
Control Autoclitic	30	1	204	2	1	71	67	13	389
Affective Autoclitic	121	40	106	19	44	112	108	20	570
Informative Autoclitic	68	0	289	0	0	99	113	41	610
TOTALS	410	54	1265	28	74	527	556	260	3194

INTERACTION BY CATEGORIES AND PEOPLE FOR TAVISTOCK SESSION 1 - PERCENTAGES

	Ron	Lois	Katie	Carol	Ellen-Ann	Lilly	Nancie	Trainer	Group
Mand	2	2	4	0	0	5	11	8	5
Tact	4	2	3	4	1	4	5	22	5
Extended Tact	5	0	4	0	0	7	5	8	6
Echoic	26	20	15	21	38	15	15	15	17
Intraverbal	11	0	27	0	0	15	12	19	18
Control Autoclitic	7	2	16	7	1	13	12	5	12
Affective Autoclitic	30	74	8	69	59	21	19	8	18
Informative Autoclitic	17	0	23	0	0	19	20	16	19
TOTALS	100	100	100	100	100	100	100	100	100

INTERACTION BY CATEGORIES AND PEOPLE FOR GESTALT SESSION 1 - RAW FREQUENCIES

	Sylvia	Jane	Fritz	Jo	Lela	Mary	Lil	Trainer	Group
Mand	17	10	53	5	67	35	61	52	300
Tact	20	3	45	3	47	29	53	81	281
Extended Tact	22	1	85	5	35	20	44	17	229
Echoic	53	19	77	12	76	62	110	37	446
Intraverbal	84	4	212	4	98	63	149	50	658
Control Autoclitic	16	10	283	4	51	57	73	40	534
Affective Autoclitic	42	102	147	36	108	177	91	81	784
Informative Autoclitic	76	10	275	4	91	76	146	82	760
TOTALS	330	159	1177	73	573	519	727	440	4001

INTERACTION BY CATEGORIES AND PEOPLE FOR GESTALT SESSION 1 - PERCENTAGES

	Sylvia	Jane	Fritz	Jo	Lela	Mary	Lil	Trainer	Group
Mand	5	6	5	7	12	7	8	12	7
Tact	6	2	4	4	8	6	7	18	7
Extended Tact	7	1	7	7	6	4	6	4	6
Echoic	16	12	7	16	13	12	15	8	11
Intraverbal	25	3	18	5	17	12	20	11	16
Control Autoclitic	5	6	24	5	9	11	10	9	13
Affective Autoclitic	13	64	12	49	19	34	13	18	20
Informative Autoclitic	23	6	23	5	16	15	20	19	19
TOTALS	100	100	100	100	100	100	100	100	100